List of Publications

[1] E.D. Sontag. *Notes on Mathematical Systems Biology*. 2024.

[2] A. Gupta and E. D. Sontag. Cumulative dose responses for adapting biological systems. *Royal society Interface*, 2024. Submitted. Also preprint in https://doi.org/10.1101/2024.11.22.624851.

[3] A. Duvall, M. Ali Al-Radhawi, Dhruv D. Jatkar, and E. D. Sontag. Interplay between contractivity and monotonicity for reaction networks. *SIAM J Applied Dynamical Systems*, 2024. Submitted. Also preprint in https://arxiv.org/abs/2404.18734.

[4] D. Biswas, E.D Sontag, and N.J. Cowan. An exact active sensing strategy for a class of bio-inspired systems. In *Proc. 23rd European Control Conference*, 2024. Submitted. Also preprint in https://arxiv.org/abs/2411.06612 .

[5] E.D. Sontag. A concept of antifragility for dynamical systems. *arXiv*, 2024.

[6] B. de Freitas Magalhães, G. Fan, E.D. Sontag, K. Josić, and M.R. Bennett. Pattern formation and bistability in a synthetic intercellular genetic toggle. *ACS Synthetic Biology*, 13:2844–2860, 2024.

[7] J.L Gevertz, J.M Greene, S. Prosperi, N. Comandante-Lou, and E.D. Sontag. Understanding therapeutic tolerance through a mathematical model of drug-induced resistance. *npj Systems Biology and Applications*, 2024. Submitted. Preprint in biorxiv https://www.biorxiv.org/content/10.1101/2024.09.04.611211v1.

[8] S. Wang, M.A. Al-Radhawi, D.A. Lauffenburger, and E.D. Sontag. How many time-points of single-cell omics data are necessary for recovering biomolecular network dynamics? *npj Systems Biology and Applications*, 10, 2024.

[9] M. Ali Al-Radhawi, K. Manoj, D. Jatkar, A. Duvall, D. Del Vecchio, and E.D. Sontag. Competition for binding targets results in paradoxical effects for simultaneous activator and repressor action. In *Proc. 63rd IEEE Conference on Decision and Control (CDC)*, 2024. To appear. Preprint in arXiv.

[10] A. Duvall and E.D. Sontag. A remark on omega limit sets for non-expansive dynamics. In *Proc. 63rd IEEE Conference on Decision and Control (CDC)*, 2024. To appear. Preprint in arXiv.

[11] A.C.B de Olivera, M. Siami, and E.D. Sontag. Convergence analysis of overparametrized LQR formulations. *Automatica*, 2024. Submitted. Preprint in arXiv 2408.15456.

[12] A.C.B de Olivera, M. Siami, and E.D. Sontag. Remarks on the gradient training of linear neural network based feedback for the LQR problem. In *Proc. 2024 63rd IEEE Conference on Decision and Control (CDC)*, 2024. To appear. Preprint in arXiv.

[13] I. Incer, A. Pandey, E. Peterson, N. Nolan, K. E. Galloway, R. M. Murray, E. D. Sontag, and D. Del Vecchio. Guaranteeing system-level properties in genetic circuits subject to context effects. In *Proc. 2024 63rd IEEE Conference on Decision and Control (CDC)*, 2024. To appear.

[14] P. Yu and E.D. Sontag. A necessary condition for non-monotonic dose response, with an application to a kinetic proofreading model. In *Proc. 2024 63rd IEEE Conference on Decision and Control (CDC)*, 2024. To appear. Note: there is an extended version in arXiv; journal paper in preparation.

[15] M. Sadeghi, I. Kareva, G. Pogudin, and E.D. Sontag. Quantitative pharmacology methods for bispecific T cell engagers. *Bulletin of Mathematical Biology*, 2024. Submitted.

[16] Z. Liu, N. Ozay, and E. D. Sontag. Properties of immersions for systems with multiple limit sets with implications to learning Koopman embeddings. *Automatica*, 2024. Under revision. Preprint in https://arxiv.org/abs/2312.17045, 2023/2024.

[17] L. Cui, Z.P. Jiang, and E. D. Sontag. Small-disturbance input-to-state stability of perturbed gradient flows: Applications to LQR problem. *Systems and Control Letters*, 188:105804, 2024.

[18] A. Duvall and E. D. Sontag. Global exponential stability or contraction of an unforced system do not imply entrainment to periodic inputs. In *Proc. 2024 Automatic Control Conference*, pages 1837–1842, 2024. Also preprint in arXiv:2310.03241.

[19] M. D. Kvalheim and E. D. Sontag. Why should autoencoders work? *Transactions on Machine Learning Research*, 2024. See also 2023 preprint in https://arxiv.org/abs/2310.02250.

[20] A.C.B de Olivera, M. Siami, and E.D. Sontag. Dynamics and perturbations of overparameterized linear neural networks. In *Proc. 2023 62st IEEE Conference on Decision and Control (CDC)*, pages 7356–7361, 2023. Extended version is "On the ISS property of the gradient flow for single hidden-layer neural networks with linear activations", arXiv https://arxiv.org/abs/2305.09904.

[21] J.P. Padmakumar, J. Sun 2, W. Cho 3, Y. Zhou, C. Krenz, Zhong Han W.Z, D. Densmore, E. D. Sontag, and C.A. Voigt. Partitioning of a 2-bit hash function across 66 communicating cells. *Nature Chemical Biology*, 20, 2024.

[22] Z. An, M.A. Al-Radhawi, W. Cho, and E.D. Sontag. Inferring causal connections through embedded physics-informed neural networks (ePINNs): An application to synthetic biology resource competition. 2024. In preparation.

[23] S. Wang, E.D. Sontag, and D.A. Lauffenburger. What cannot be seen correctly in 2D visualizations of single-cell 'omics data? *Cell Systems*, 14:723–731, 2023.

[24] M.A. Al-Radhawi, D. Angeli, and E.D. Sontag. On structural contraction of biological interaction networks. *SIAM J Applied Dynamical Systems*, 2025. Submitted. Preprint in: arXiv http://arxiv.org/abs/2307.13678.

[25] A.C.B. de Oliveira, M. Siami, and E. D. Sontag. Regularising numerical extremals along singular arcs: a Lie-theoretic approach. In M.A. Belabbas, editor, *Geometry and Topology in Control, Proceedings of BIRS Workshop*. American Institute of Mathematical Sciences Press, 2024. To appear.

[26] A.C.B. de Oliveira, M. Siami, and E. D. Sontag. Edge selections in bilinear dynamic networks. *IEEE Transactions on Automatic Control*, 69(1):331–338, 2024.

[27] Z. Liu, N. Ozay, and E. D. Sontag. On the non-existence of immersions for systems with multiple omega-limit sets. In *22nd IFAC World Congress, IFAC-PapersOnLine*, volume 56, pages 60–64, 2023. This is a preliminary version of the journal paper "Properties of immersions for systems with multiple limit sets with implications to learning Koopman embeddings".

[28] E.D. Sontag, D. Biswas, and N.J. Cowan. An observability result related to active sensing. Technical report, 2022. arXiv 2210.03848.

[29] A.C.B de Olivera, M. Siami, and E.D. Sontag. Sensor and actuator scheduling in bilinear dynamical networks. In *Proc. 2022 61st IEEE Conference on Decision and Control (CDC)*, page WeCT09.4, 2022.

[30] M. Sznaier, A. Olshevsky, and E.D. Sontag. The role of systems theory in control oriented learning. In *Proc. 25th Int. Symp. Mathematical Theory of Networks and Systems (MTNS 2022)*, 2022. To appear.

[31] M.A. Al-Radhawi, S. Tripathi, Y. Zhang, E.D. Sontag, and H. Levine. Epigenetic factor competition reshapes the EMT landscape. *Proc Natl Acad Sci USA*, 119:e2210844119, 2022.

[32] M.A. Al-Radhawi, D. Del Vecchio, and E.D. Sontag. Identifying competition phenotypes in synthetic biochemical circuits. *IEEE Control Systems Letters*, 7:211–216, 2023. (Online published in 2022; in print 2023.).

[33] M. Bin, J. Huang, A. Isidori, L. Marconi, M. Mischiati, and E. D. Sontag. Internal models in control, bioengineering, and neuroscience. *Annual Review of Control, Robotics, and Autonomous Systems*, 5:20.1–20.25, 2022.

[34] E.D. Sontag. Remarks on input to state stability of perturbed gradient flows, motivated by model-free feedback control learning. *Systems and Control Letters*, 161:105138, 2022. Important: there is an error in the paper. For the LQR application, the paper only shows iISS, not ISS. See the paper "Small-disturbance input-to-state stability of perturbed gradient flows: Applications to LQR problem" for details.

[35] J M Greene and E D Sontag. Minimizing the infected peak utilizing a single lockdown: a technical result regarding equal peaks. In *Proc. 2022 Automatic Control Conference*, pages 3640–3647, 2022.

[36] T. Chen, M. A. Al-Radhawi, C.A. Voigt, and E.D. Sontag. A synthetic distributed genetic multi-bit counter. *iScience*, 24:103526, 2021.

[37] A.P. Tran, M.A. Al-Radhawi, E. Ernst, and E.D. Sontag. Optimization of heuristic logic synthesis by iteratively reducing circuit substructures using a database of optimal implementations. 2021. submitted.

[38] M.A. Al-Radhawi, M. Margaliot, and E. D. Sontag. Maximizing average throughput in oscillatory biochemical synthesis systems: an optimal control approach. *Royal Society Open Science*, 8(9):210878, 2021.

[39] E. A. Hernandez-Vargas, G. Giordano, E.D. Sontag, J. G. Chase, H. Chang, and A. Astolfi. First special section on systems and control research efforts against covid-19 and future pandemics. *Annual Reviews in Control*, 50:343–344, 2020.

[40] E. A. Hernandez-Vargas, G. Giordano, E.D. Sontag, J. G. Chase, H. Chang, and A. Astolfi. Second special section on systems and control research efforts against covid-19 and future pandemics. *Annual Reviews in Control*, 51:424–425, 2021.

[41] E. A. Hernandez-Vargas, G. Giordano, E.D. Sontag, J. G. Chase, H. Chang, and A. Astolfi. Third special section on systems and control research efforts against covid-19 and future pandemics. *Annual Reviews in Control*, 52:446–447, 2021.

[42] E.D. Sontag. An explicit formula for minimizing the infected peak in an SIR epidemic model when using a fixed number of complete lockdowns. *International Journal of Robust and Nonlinear Control, Special Issue on Control-Theoretic Approaches for Systems in the Life Sciences*, pages 1–24, 2021.

[43] E.A. Hernandez-Vargas, G. Giordano, E. D. Sontag, J. G. Chase, H. Chang, and A. Astolfi. First special section on systems and control research efforts against covid-19 and future pandemics. *Annual Reviews in Control*, 50:343–344, 2020.

[44] J. Hanson, M. Raginsky, and E.D. Sontag. Learning recurrent neural net models of nonlinear systems. *Proc. of Machine Learning Research*, 144:1–11, 2021.

[45] M.A. Al-Radhawi, M. Sadeghi, and E.D. Sontag. Long-term regulation of prolonged epidemic outbreaks in large populations via adaptive control: a singular perturbation approach. *IEEE Control Systems Letters*, 6:578–583, 2022.

[46] D. Angeli, M.A. Al-Radhawi, and E.D. Sontag. A robust lyapunov criterion for non-oscillatory behaviors in biological interaction networks. *IEEE Transactions on Automatic Control*, 67(7):3305–3320, 2022.

[47] A.C.B de Olivera, M. Siami, and E.D. Sontag. Eminence in noisy bilinear networks. In *Proc. 2021 60th IEEE Conference on Decision and Control (CDC)*, pages 4835–4840, 2021.

[48] J. Miller, M.A. Al-Radhawi, and E.D. Sontag. Mediating ribosomal competition by splitting pools. In *Proc. 2021 Automatic Control Conference*, pages 1897–1902, 2021.

[49] A.C.B de Olivera, M. Siami, and E.D. Sontag. Bilinear dynamical networks under malicious attack: an efficient edge protection method. In *Proc. 2021 Automatic Control Conference*, pages 1210–1216, 2021.

[50] M. Sadeghi, J.M. Greene, and E.D. Sontag. Universal features of epidemic models under social distancing guidelines. *Annual Reviews in Control*, 51:426–440, 2021. Also in bioRxiv, 2020, https://www.biorxiv.org/content/10.1101/2020.06.21.163931v2.

[51] A.P. Tran, J.H. Meldon, and E.D. Sontag. Transient diffusion into a bi-layer membrane with mass transfer resistance: Exact solution and time lag analysis. *Frontiers in Chemical Engineering*, 2:25, 2021.

[52] K. Johnson, G. Howard, D. Morgan, E. Brenner, A. Gardner, R. Durrett, W. Mo, A. Al'Khafaji, E.D. Sontag, A. Jarrett, T. Yankeelov, and A. Brock. Integrating transcriptomics and bulk time course data into a mathematical framework to describe and predict therapeutic resistance in cancer. *Physical Biology*, 18:016001, 2021.

[53] N. Trendel, P. Kruger, S. Gaglione, J. Nguyen, J. Pettmann, E.D. Sontag, and O. Dushek. Perfect adaptation of CD8+ T cell responses to constant antigen input over a wide range of affinity is overcome by costimulation. *Science Signaling*, 14:eaay9363, 2021.

[54] H. Hong, J. Kim, M.A. Al-Radhawi, E.D. Sontag, and J. K. Kim. Derivation of stationary distributions of biochemical reaction networks via structure transformation. *Communications Biology*, 4:620–, 2021.

[55] M.A. Al-Radhawi and E.D. Sontag. Analysis of a reduced model of epithelial-mesenchymal fate determination in cancer metastasis as a singularly-perturbed monotone system. In C.A. Beattie, P. Benner, M. Embree, S. Gugercin, and S. Lefteriu, editors, *Realization and model reduction of dynamical systems*. Springer Nature, 2022. (Previous version: 2020 preprint in arXiv:1910.11311.).

[56] E.D. Sontag. Bell-shaped dose response for a system with no IFFLs. *bioRxiv*, 2020.

[57] J. Miller, M.A. Al-Radhawi, and E.D. Sontag. Mediating ribosomal competition by splitting pools. *IEEE Control Systems Letters*, 5:1555–1560, 2020.

[58] A.L. Williams, J.E. Fitzgerald, F. Ivich, E.D. Sontag, and M. Niedre. Comment on "in vivo flow cytometry reveals a circadian rhythm of circulating tumor cells". *npg Light: Science & Applications*, 10:188, 2021.

[59] A.L. Williams, J.E. Fitzgerald, F. Ivich, E.D. Sontag, and M. Niedre. Short-term circulating tumor cell dynamics in mouse xenograft models and implications for liquid biopsy. *Frontiers in Oncology*, 10:2447–, 2020.

[60] J.L. Gevertz, J.M. Greene, C Hixahuary Sanchez Tapia, and E D Sontag. A novel covid-19 epidemiological model with explicit susceptible and asymptomatic isolation compartments reveals unexpected consequences of timing social distancing. *Journal of Theoretical Biology*, 510:110539, 2020.

[61] M.A. Al-Radhawi, A.P. Tran, E. Ernst, T. Chen, C.A. Voigt, and E.D. Sontag. Distributed implementation of Boolean functions by transcriptional synthetic circuits. *ACS Synthetic Biology*, 9:2172–2187, 2020.

[62] A.P. Tran, M.A. Al-Radhawi, I. Kareva, J. Wu, D.J. Waxman, and E.D. Sontag. Delicate balances in cancer chemotherapy: Modeling immune recruitment and emergence of systemic drug resistance. *Frontiers in Immunology*, 11:1376–, 2020.

[63] J. M. Greene, C. Sanchez-Tapia, and E.D. Sontag. Mathematical details on a cancer resistance model. *Frontiers in Bioengineering and Biotechnology*, 8:501: 1–27, 2020.

[64] T. Chen, M.A. Al-Radhawi, and E.D. Sontag. A mathematical model exhibiting the effect of DNA methylation on the stability boundary in cell-fate networks. *Epigenetics*, 15:1–22, 2020. PMID: 32842865.

[65] M.A. Al-Radhawi, D. Angeli, and E.D. Sontag. A computational framework for a Lyapunov-enabled analysis of biochemical reaction networks. *PLoS Computational Biology*, page 16(2): e1007681, 2020.

[66] D.K. Agrawal, E.M. Dolan, N.E. Hernandez, K.M. Blacklock, S.D. Khare, and E.D. Sontag. Mathematical models of protease-based enzymatic biosensors. *ACS Synthetic Biology*, 9:198–208, 2020.

[67] E.D. Sontag. Input-to-State Stability. In J. Baillieul and T. Samad, editors, *Encyclopedia of Systems and Control*, pages 1–9. Springer-Verlag, 2020.

[68] E.D. Sontag. Scale-invariance in biological sensing. In J. Baillieul and T. Samad, editors, *Encyclopedia of Systems and Control*, pages 1–4. Springer-Verlag, 2020.

[69] S. Wang, J.-R. Lin, E.D. Sontag, and P.K. Sorger. Inferring reaction network structure from single-cell, multiplex data, using toric systems theory. *PLoS Computational Biology*, 15:e1007311, 2019.

[70] D. K. Agrawal, R. Marshall, M.A. Al-Radhawi, V. Noireaux, and E. D. Sontag. Some remarks on robust gene regulation in a biomolecular integral controller. In *Proc. 2019 IEEE Conf. Decision and Control*, pages 2820–2825, 2019.

[71] M. Sadeghi, M.A. Al-Radhawi, M. Margaliot, and E.D. Sontag. No switching policy is optimal for a positive linear system with a bottleneck entrance. *IEEE Control Systems Letters*, 3:889–894, 2019. (Also in Proc. 2019 IEEE Conf. Decision and Control.).

[72] S. Bruno, M.A. Al-Radhawi, E.D. Sontag, and D. Del Vecchio. Stochastic analysis of genetic feedback controllers to reprogram a pluripotency gene regulatory network. In *Proc. 2019 Automatic Control Conference*, pages 5089–5096, 2019.

[73] D.K. Agrawal, R. Marshall, V. Noireaux, and E.D. Sontag. In vitro implementation of robust gene regulation in a synthetic biomolecular integral controller. *Nature Communications*, 10:1–12, 2019.

[74] J.L. Gevertz, J.M. Greene, and E.D. Sontag. Validation of a mathematical model of cancer incorporating spontaneous and induced evolution to drug resistance. Technical report, Cold Spring Harbor Laboratory, 2019. BioRxiv preprint 10.1101/2019.12.27.889444.

[75] T. Chen, M. A. Al-Radhawi, and E. D. Sontag. A mathematical model exhibiting the effect of dna methylation on the stability boundary in cell-fate networks. Technical report, Cold Spring Harbor Laboratory, 2019. BioRxiv preprint 10.1101/2019.12.19.883280.

[76] A. P. Tran, M. A. Al-Radhawi, I. Kareva, J. Wu, D. J. Waxman, and E. D. Sontag. Delicate balances in cancer chemotherapy: modeling immune recruitment and emergence of systemic drug resistance. Technical report, Cold Spring Harbor Laboratory, 2019. bioRxiv 2019.12.12.874891.

[77] M. Margaliot and E.D. Sontag. Compact attractors of an antithetic integral feedback system have a simple structure. Technical report, bioRxiv 2019/868000v1, 2019.

[78] J.M. Greene, C. Sanchez-Tapia, and E.D. Sontag. Mathematical details on a cancer resistance model. Technical report, bioRxiv 2018/475533, 2018.

[79] M. Sadeghi, M.A. Al-Radhawi, M. Margaliot, and E.D. Sontag. On the periodic gain of the ribosome flow model. Technical report, bioRxiv 2018/507988, 2018.

[80] M. Margaliot and E.D. Sontag. Revisiting totally positive differential systems: A tutorial and new results. *Automatica*, 101:1–14, 2019.

[81] D. Del Vecchio, Y. Qian, R.M Murray, and E.D. Sontag. Future systems and control research in synthetic biology. *Annual Reviews in Control*, 45:5–17, 2018.

[82] E.V. Nikolaev, A. Zloza, and E.D. Sontag. Immunobiochemical reconstruction of influenza lung infection - melanoma skin cancer interactions. *Frontiers in Immunology*, 10:Article 4, 2019.

[83] J. Huang, A. Isidori, L. Marconi, M. Mischiati, E. D. Sontag, and W. M. Wonham. Internal models in control, biology and neuroscience. In *Proc. 2018 IEEE Conf. Decision and Control*, pages 5370–5390, 2018.

[84] F. Blanchini, H. El-Samad, G. Giordano, and E. D. Sontag. Control-theoretic methods for biological networks. In *Proc. 2018 IEEE Conf. Decision and Control*, pages 466–483, 2018.

[85] M. Margaliot and E.D. Sontag. Analysis of nonlinear tridiagonal cooperative systems using totally positive linear differential systems. In *Proc. 2018 IEEE Conf. Decision and Control*, pages 3104–3109, 2018.

[86] M.A. Al-Radhawi, N.S. Kumar, E.D. Sontag, and D. Del Vecchio. Stochastic multistationarity in a model of the hematopoietic stem cell differentiation network. In *Proc. 2018 IEEE Conf. Decision and Control*, pages 1886–1892, 2018.

[87] J.M. Greene, C. Sanchez-Tapia, and E.D. Sontag. Control structures of drug resistance in cancer chemotherapy. In *Proc. 2018 IEEE Conf. Decision and Control*, pages 5195–5200, 2018.

[88] J.M. Greene, J.L. Gevertz, and E. D. Sontag. A mathematical approach to distinguish spontaneous from induced evolution of drug resistance during cancer treatment. *JCO Clinical Cancer Informatics*, DOI: 10.1200/CCI.18.00087:1–20, 2019.

[89] A. Rendall and E. D. Sontag. Multiple steady states and the form of response functions to antigen in a model for the initiation of t cell activation. *Royal Society Open Science*, 4:170821–, 2017.

[90] M. A. Al-Radhawi, D. Del Vecchio, and E. D. Sontag. Multi-modality in gene regulatory networks with slow gene binding. *PLoS Computational Biology*, 15:e1006784, 2019.

[91] E.D. Sontag. Dynamic compensation, parameter identifiability, and equivariances. *PLoS Computational Biology*, 13:e1005447, 2017. (Preprint was in bioRxiv https://doi.org/0.1101/095828, 2016).

[92] L. Yang, E.M. Dolan, S.K. Tan, T. Lin, E.D. Sontag, and S.D. Khare. Computation-guided design of a stimulus-responsive multi-enzyme supramolecular assembly, systems biology. *ChemBioChem*, 18:2000–2006, 2017.

[93] A. Silva, M. Silva, P. Sudalagunta, A. Distler, T. Jacobson, A. Collins, T. Nguyen, J. Song, D.T. Chen, Lu Chen, C. Cubitt, R. Baz, L. Perez, D. Rebatchouk, W. Dalton, J.M. Greene, R. Gatenby, R. Gillies, E.D. Sontag, M. Meads, and K. Shain. An ex vivo platform for the prediction of clinical response in multiple myeloma. *Cancer Research*, pages 10.1158/0008–5472.CAN–17–0502, 2017.

[94] J. K. Kim and E.D. Sontag. Reduction of multiscale stochastic biochemical reaction networks using exact moment derivation. *PLoS Computational Biology*, 13:13(6): e1005571, 2017.

[95] S. Barish, M.F. Ochs, E.D. Sontag, and J.L. Gevertz. Evaluating optimal therapy robustness by virtual expansion of a sample population, with a case study in cancer immunotherapy. *Proc Natl Acad Sci USA*, 114:E6277–E6286, 2017.

[96] S. J. Rahi, J. Larsch, K. Pecani, N. Mansouri, A. Y. Katsov, K. Tsaneva-Atanasova, E. D. Sontag, and F. R. Cross. Oscillatory stimuli differentiate adapting circuit topologies. *Nature Methods*, 14:1010–1016, 2017.

[97] V. H. Nagaraj, J. M. Greene, A. M. Sengupta, and E.D. Sontag. Translation inhibition and resource balance in the TX-TL cell-free gene expression system. *Synthetic Biology*, 2:ysx005, 2017.

[98] E.V. Nikolaev, S.J. Rahi, and E.D. Sontag. Chaos in simple periodically-forced biological models. *Biophysical Journal*, 114:1232–1240, 2018.

[99] T.H. Segall-Shapiro, E. D. Sontag, and C. A. Voigt. Engineered promoters enable constant gene expression at any copy number in bacteria. *Nature Biotechnology*, 36:352–358, 2018.

[100] E.D. Sontag. A dynamical model of immune responses to antigen presentation predicts different regions of tumor or pathogen elimination. *Cell Systems*, 4:231–241, 2017.

[101] Y. Vodovotz, A. Xia, E. Read, J. Bassaganya-Riera, D.A. Hafler, E.D. Sontag, J. Wang, J.S. Tsang, J.D. Day, S. Kleinstein, A.J. Butte, M.C. Altman, R. Hammond, C. Benoist, and S.C. Sealfon. Solving immunology? *Trends in Immunology*, 38:116–127, 2017.

[102] M. Lang and E.D. Sontag. Zeros of nonlinear systems with input invariances. *Automatica*, 81:46–55, 2017.

[103] F. Menolascina, R. Rusconi, V.I. Fernandez, S.P. Smriga, Z. Aminzare, E. D. Sontag, and R. Stocker. Logarithmic sensing in bacillus subtilis aerotaxis. *Nature Systems Biology and Applications*, 3:16036–, 2017.

[104] Y. Zarai, M. Margaliot, E.D. Sontag, and T. Tuller. Controllability analysis and control synthesis for the ribosome flow model. *IEEE/ACM Transactions on Computational Biology and Bioinformatics*, 15:1351–1364, 2018.

[105] E.D. Sontag. Two-zone tumor tolerance can arise from a simple immunological feedforward motif that estimates tumor growth rates. Technical report, bioRxiv https://doi.org/10.1101/095455, 2016.

[106] E.D. Sontag. Examples of computation of exact moment dynamics for chemical reaction networks. In R. Tempo, S. Yurkovich, and P. Misra, editors, *Emerging Applications of Control and Systems Theory*, volume 473 of *Lecture Notes in Control and Inform. Sci.*, pages 295–312. Springer-Verlag, Berlin, 2018.

[107] E.D. Sontag. Examples of computation of exact moment dynamics for chemical reaction networks. Technical report, arXiv:1612.02393, 2016.

[108] E.V. Nikolaev and E.D. Sontag. Quorum-sensing synchronization of synthetic toggle switches: A design based on monotone dynamical systems theory. *PLoS Computational Biology*, 12:e1004881, 2016.

[109] Z. Aminzare and E.D. Sontag. Some remarks on spatial uniformity of solutions of reaction-diffusion PDEs. *Nonlinear Analysis*, 147:125–144, 2016.

[110] E.D. Sontag. Input-to-State Stability. In J. Baillieul and T. Samad, editors, *Encyclopedia of Systems and Control*. Springer-Verlag, 2015.

[111] A. Raveh, M. Margaliot, E.D. Sontag, and T. Tuller. A model for competition for ribosomes in the cell. *Proc. Royal Society Interface*, 13:2015.1062, 2016.

[112] M. Margaliot, E.D. Sontag, and T. Tuller. Contraction after small transients. *Automatica*, 67:178–184, 2016.

[113] J.A. Ascensao, P. Datta, B. Hancioglu, E.D. Sontag, M.L. Gennaro, and O.A. Igoshin. Non-monotonic response dynamics of glyoxylate shunt genes in mycobacterium tuberculosis. *PLoS Computational Biology*, 12:e1004741, 2016.

[114] Y. Zarai, M. Margaliot, E.D. Sontag, and T. Tuller. Controlling the ribosomal density profile in mRNA translation. In *Proc. IEEE Conf. Decision and Control, Dec. 2016*, pages 4184–4189, 2016.

[115] E.D. Sontag. Some remarks on a model for immune signal detection and feedback. In *Proc. IEEE Conf. Decision and Control, Dec. 2016*, pages 2475–2480, 2016.

[116] Q. Tyles, T. Kang, E.D. Sontag, and L. Bleris. Exploring the impact of resource limitations on gene network reconstruction. In *Proc. IEEE Conf. Decision and Control, Dec. 2016*, pages 3350–3355, 2016.

[117] F. Menolascina, R. Stocker, and E.D. Sontag. In-vivo identification and control of aerotaxis in Bacillus subtilis. In *Proc. IEEE Conf. Decision and Control, Dec. 2016*, pages 764–769, 2016.

[118] M. Margaliot, E.D. Sontag, and T. Tuller. Checkable conditions for contraction after small transients in time and amplitude. In N. Petit, editor, *Feedback Stabilization of Controlled Dynamical Systems - In Honor of Laurent Praly*, volume 473 of *Lecture Notes in Control and Inform. Sci.*, pages 279–305. Springer-Verlag, Berlin, 2017.

[119] M. Lang and E.D. Sontag. Scale-invariant systems realize nonlinear differential operators. In *2016 American Control Conference (ACC)*, pages 6676 – 6682, 2016.

[120] E.D. Sontag. A remark on incoherent feedforward circuits as change detectors and feedback controllers. Technical report, arXiv:1602.00162, 2016.

[121] E.D. Sontag. Incoherent feedforward motifs as immune change detectors. Technical report, bioRxiv http://dx.doi.org/10.1101/035600, December 2015.

[122] E.D. Sontag and A. Singh. Exact moment dynamics for feedforward nonlinear chemical reaction networks. *IEEE Life Sciences Letters*, 1:26–29, 2015.

[123] P. Bastiaens, M. R. Birtwistle, N. Bluthgen, F. J. Bruggeman, K.-H. Cho, C. Cosentino, A. de la Fuente, J. B. Hoek, A. Kiyatkin, S. Klamt, W. Kolch, S. Legewie, P. Mendes, T. Naka, T. Santra, E.D. Sontag, H. V. Westerhoff, and B. N. Kholodenko. Silence on the relevant literature and errors in implementation. *Nature Biotech*, 33:336–339, 2015.

[124] T. Kang, R. Moore, Y. Li, E.D. Sontag, and L. Bleris. Discriminating direct and indirect connectivities in biological networks. *Proc Natl Acad Sci USA*, 112:12893–12898, 2015.

[125] A. O. Hamadeh, E.D. Sontag, and D. Del Vecchio. A contraction approach to output tracking via high-gain feedback. In *Proc. IEEE Conf. Decision and Control, Dec. 2015*, pages 7689–7694, 2015.

[126] M. Marcondes de Freitas and E.D. Sontag. A small-gain theorem for random dynamical systems with inputs and outputs. *SIAM J. Control and Optimization*, 53:2657–2695, 2015.

[127] Z. Aminzare and E.D. Sontag. Synchronization of diffusively-connected nonlinear systems: results based on contractions with respect to general norms. *IEEE Transactions on Network Science and Engineering*, 1(2):91–106, 2014.

[128] E.D. Sontag. A technique for determining the signs of sensitivities of steady states in chemical reaction networks. *IET Systems Biology*, 8:251–267, 2014. Code is here: https://github.com/sontaglab/CRNSeSi.

[129] T.H. Segall-Shapiro, A.J. Meyer, A.D. Ellington, E.D. Sontag, and C.A. Voigt. A 'resource allocator' for transcription based on a highly fragmented T7 RNA polymerase. *Molecular Systems Biology*, 10:742–, 2014.

[130] E.D. Sontag, M. Margaliot, and T. Tuller. On three generalizations of contraction. In *Proc. IEEE Conf. Decision and Control, Los Angeles, Dec. 2014*, pages 1539–1544, 2014.

[131] E.D. Sontag. Quantifying the effect of interconnections on the steady states of biomolecular networks. In *Proc. IEEE Conf. Decision and Control, Los Angeles, Dec. 2014*, pages 5419–5424, 2014.

[132] M. Skataric, E.V. Nikolaev, and E.D. Sontag. Scale-invariance in singularly perturbed systems. In *Proc. IEEE Conf. Decision and Control, Los Angeles, Dec. 2014*, pages 3035–3040, 2014.

[133] Z. Aminzare and E.D. Sontag. Contraction methods for nonlinear systems: A brief introduction and some open problems. In *Proc. IEEE Conf. Decision and Control, Los Angeles, Dec. 2014*, pages 3835–3847, 2014.

[134] Z. Aminzare and E.D. Sontag. Remarks on diffusive-link synchronization using non-Hilbert logarithmic norms. In *Proc. IEEE Conf. Decision and Control, Los Angeles, Dec. 2014*, pages 6086–6091, 2014.

[135] M. Skataric and E.D. Sontag. Remarks on model-based estimation of nonhomogeneous Poisson processes and applications to biological systems. In *Proc. European Control Conference, Strasbourg, France, June 2014*, pages 2052–2057, 2014.

[136] J. Barton and E.D. Sontag. Remarks on the energy costs of insulators in enzymatic cascades. Technical report, http://arxiv.org/abs/1412.8065, December 2014.

[137] S. Prabakaran, J. Gunawardena, and E.D. Sontag. Paradoxical results in perturbation-based signaling network reconstruction. *Biophysical Journal*, 106:2720–2728, 2014.

[138] D. Angeli, G.A. Enciso, and E.D. Sontag. A small-gain result for orthant-monotone systems under mixed feedback. *Systems and Control Letters*, 68:9–19, 2014.

[139] M. Skataric, E.V. Nikolaev, and E.D. Sontag. A fundamental limitation to fold-change detection by biological systems with multiple time scales. *IET Systems Biology*, 9:1–15, 2015.

[140] E.D. Sontag. Stability and feedback stabilization. In Robert Meyers, editor, *Mathematics of Complexity and Dynamical Systems*, pages 1639–1652. Springer-Verlag, Berlin, 2011.

[141] J. Barton and E.D. Sontag. The energy costs of insulators in biochemical networks. *Biophysical Journal*, 104:1390–1380, 2013.

[142] A. White, B. Lees, H.-L. Kao, G. Cipriani, E. Munarriz, A. Paaby, K. Erickson, S. Guzman, K. Rattanakorn, E.D. Sontag, D. Geiger, K. Gunsalus, and F. Piano. Devstar: A novel algorithm for quantitative phenotyping of c. elegans development. *IEEE Transactions on Medical Imaging*, 32:1791–1803, 2013.

[143] M. Margaliot, E.D. Sontag, and T. Tuller. Entrainment to periodic initiation and transition rates in a computational model for gene translation. *PLoS ONE*, 9(5):e96039, 2014.

[144] Z. Aminzare, Y. Shafi, M. Arcak, and E.D. Sontag. Guaranteeing spatial uniformity in reaction-diffusion systems using weighted l_2-norm contractions. In V. Kulkarni, G.-B. Stan, and K. Raman, editors, *A Systems Theoretic Approach to Systems and Synthetic Biology I: Models and System Characterizations*, pages 73–101. Springer-Verlag, 2014.

[145] M. Marcondes de Freitas and E.D. Sontag. Random dynamical systems with inputs. In C. Pötzsche and P. Kloeden, editors, *Nonautonomous Dynamical Systems in the Life Sciences, Lecture Notes in Mathematics vol. 2102*, pages 41–87. Springer-Verlag, 2013.

[146] L. Liu, G. Duclos, B. Sun, J. Lee, A. Wu, Y. Kam, E.D. Sontag, H.A. Stone, J.C. Sturm, R.A. Gatenby, and R.H. Austin. Minimization of thermodynamic costs in cancer cell invasion. *Proc Natl Acad Sci USA*, 110:1686–1691, 2013.

[147] J. Barton and E.D. Sontag. The energy costs of biological insulators. Technical report, http://arxiv.org/abs/1210.3809, October 2012.

[148] Z. Aminzare and E.D. Sontag. Logarithmic Lipschitz norms and diffusion-induced instability. *Nonlinear Analysis: Theory, Methods & Applications*, 83:31–49, 2013.

[149] A.O. Hamadeh, B.P. Ingalls, and E.D. Sontag. Transient dynamic phenotypes as criteria for model discrimination: fold-change detection in Rhodobacter sphaeroides chemotaxis. *Proc. Royal Society Interface*, 10:20120935, 2013.

[150] V. Shimoga, J.T. White, Y. Li, E.D. Sontag, and L. Bleris. Synthetic mammalian transgene negative autoregulation. *Molecular Systems Biology*, 9:670–, 2013.

[151] T. Kang, J.T. White, Z. Xie, Y. Benenson, E.D. Sontag, and L. Bleris. Reverse engineering validation using a benchmark synthetic gene circuit in human cells. *ACS Synthetic Biology*, 2:255–262, 2013.

[152] Y. Shafi, Z. Aminzare, M. Arcak, and E.D. Sontag. Spatial uniformity in diffusively-coupled systems using weighted l2 norm contractions. In *Proc. American Control Conference*, pages 5639–5644, 2013.

[153] A. O. Hamadeh, E.D. Sontag, and B.P. Ingalls. Response time re-scaling and Weber's law in adapting biological systems. In *Proc. American Control Conference*, pages 4564–4569, 2013.

[154] M. Marcondes de Freitas and E.D. Sontag. A class of random control systems: Monotonicity and the convergent-input convergent-state property. In *Proc. American Control Conference*, pages 4564–4569, 2013.

[155] Z. Aminzare and E. D. Sontag. Remarks on a population-level model of chemotaxis: advection-diffusion approximation and simulations. Technical report, arxiv:1302.2605, 2013.

[156] E.D. Sontag. A remark about polynomials with specified local minima and no other critical points. Technical report, arxiv 1302.0759, 2013.

[157] M. Skataric and E.D. Sontag. A characterization of scale invariant responses in enzymatic networks. *PLoS Computational Biology*, 8:e1002748, 2012.

[158] K. Wood, S. Nishida, E.D. Sontag, and P. Cluzel. Mechanism-independent method for predicting response to multiple drug exposure in bacteria. *Proc Natl Acad Sci USA*, 109:12254–12259, 2012.

[159] M. Miller, M. Hafner, E.D. Sontag, N. Davidsohn, S. Subramanian, P. E. M. Purnick, D. Lauffenburger, and R. Weiss. Modular design of artificial tissue homeostasis: robust control through synthetic cellular heterogeneity. *PLoS Computational Biology*, 8:e1002579–, 2012.

[160] A. Rufino Ferreira, M. Arcak, and E.D. Sontag. Stability certification of large scale stochastic systems using dissipativity of subsystems. *Automatica*, 48:2956–2964, 2012.

[161] G. Russo, M. di Bernardo, and E.D. Sontag. A contraction approach to the hierarchical analysis and design of networked systems. *IEEE Transactions Autom. Control*, 58:1328–1331, 2013.

[162] D. Angeli and E.D. Sontag. Behavior of responses of monotone and sign-definite systems. In K. Hüper and Jochen Trumpf, editors, *Mathematical System Theory - Festschrift in Honor of Uwe Helmke on the Occasion of his Sixtieth Birthday*, pages 51–64. CreateSpace, 2013.

[163] D. Angeli and E.D. Sontag. Remarks on the invalidation of biological models using monotone systems theory. In *Proc. IEEE Conf. Decision and Control, Maui, Dec. 2012*, 2012. Paper TuC09.3.

[164] A.O. Hamadeh, B.P. Ingalls, and E.D. Sontag. Fold-change detection as a chemotaxis model discrimination tool. In *Proc. IEEE Conf. Decision and Control, Maui, Dec. 2012*, 2012. Paper WeC09.2.

[165] M. Skataric and E.D. Sontag. Exploring the scale invariance property in enzymatic networks. In *Proc. IEEE Conf. Decision and Control, Maui, Dec. 2012*, 2012. Paper WeC09.2.

[166] A. Rufino Ferreira, M. Arcak, and E.D. Sontag. A decomposition-based approach to stability analysis of large-scale stochastic systems. In *Proceedings of the 2012 American Control Conference, Montreal, June 2012*, page Paper FrC10.4, 2012.

[167] A.C. Jiang, A. C. Ventura, E. D. Sontag, S. D. Merajver, A. J. Ninfa, and D. Del Vecchio. Load-induced modulation of signal transduction networks. *Science Signaling*, 4, issue 194:ra67, 2011.

[168] O. Shoval, U. Alon, and E.D. Sontag. Symmetry invariance for adapting biological systems. *SIAM Journal on Applied Dynamical Systems*, 10:857–886, 2011. (See here for a small typo: http://www.sontaglab.org/FTPDIR/shoval.alon.sontag.erratum.pdf).

[169] L. Bleris, Z. Xie, D. Glass, A. Adadey, E.D. Sontag, and Y. Benenson. Synthetic incoherent feed-forward circuits show adaptation to the amount of their genetic template. *Molecular Systems Biology*, 7:519–, 2011.

[170] R. Albert, B. DasGupta, R. Hegde, G.S. Sivanathan, A. Gitter, G. Gürsoy, P. Paul, and E.D. Sontag. A new computationally efficient measure of topological redundancy of biological and social networks. *Physical Review E*, 84:036117, 2011.

[171] S.N. Dashkovskiy, D.V. Efimov, and E.D. Sontag. Ustoichivost' ot vhoda k sostoyaniu i smezhnie svoystva sistem (in Russian, Input to state stability and allied system properties). *Avtomatika i Telemekhanika (Automation and Remote Control)*, 72(8):1579–1614, 2011.

[172] E.D. Sontag. Remarks on invariance of population distributions for systems with equivariant internal dynamics. Technical report, arxiv.1108.3245, August 2011.

[173] M. Marcondes de Freitas and E.D. Sontag. Remarks on random dynamical systems with inputs and outputs and a small-gain theorem for monotone rds. Technical report, http://arxiv.org/abs/1207.1690, July 2012.

[174] D. Angeli and E.D. Sontag. A small-gain result for orthant-monotone systems in feedback: the non sign-definite case. In *Proc. IEEE Conf. Decision and Control, Orlando, Dec. 2011*, page WeC09.1, 2011.

[175] O. Shoval, U. Alon, and E.D. Sontag. Input symmetry invariance, and applications to biological systems. In *Proc. IEEE Conf. Decision and Control, Orlando, Dec. 2011*, page TuA02.5, 2011.

[176] O. Shoval, L. Goentoro, Y. Hart, A. Mayo, E.D. Sontag, and U. Alon. Fold change detection and scalar symmetry of sensory input fields. *Proc Natl Acad Sci USA*, 107:15995–16000, 2010.

[177] B. Dasgupta, P. Vera-Licona, and E.D. Sontag. Reverse engineering of molecular networks from a common combinatorial approach. In M. Elloumi and A.Y. Zomaya, editors, *Algorithms in computational molecular biology: Techniques, Approaches and Applications*, pages 941–954. Wiley, Hoboken, 2010.

[178] A. White, P.G. Cipriani, H.-L. Kao, B. Lees, D. Geiger, E.D. Sontag, K. Gunsalus, and F. Piano. Rapid and accurate developmental stage recognition of c. elegans from high-throughput image data. In *2010 IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, pages 3089–3096, 2010.

[179] E.D. Sontag. Modularity, retroactivity, and structural identification. In H. Koeppl, G. Setti, M. di Bernardo, and D. Densmore, editors, *Design and Analysis of Biomolecular Circuits*, pages 183–202. Springer-Verlag, 2011.

[180] G. Craciun, C. Pantea, and E.D. Sontag. Graph-theoretic analysis of multistability and monotonicity for biochemical reaction networks. In H. Koeppl, G. Setti, M. di Bernardo, and D. Densmore, editors, *Design and Analysis of Biomolecular Circuits*, pages 63–72. Springer-Verlag, 2011.

[181] A.R. Teel, T.T. Georgiou, L. Praly, and E.D. Sontag. Input-output stability. In W. S. Levine, editor, *The Control Systems Handbook: Control System Advanced Methods, Second Edition.*, pages 44.1–44.23 (1011–1033). CRC Press, Boca Raton, 2011.

[182] E.D. Sontag. Input to state stability. In W. S. Levine, editor, *The Control Systems Handbook: Control System Advanced Methods, Second Edition.*, pages 45.1–45.21 (1034–1054). CRC Press, Boca Raton, 2011.

[183] G. Russo, M. di Bernardo, and E.D. Sontag. Stability of networked systems: a multi-scale approach using contraction. In *Proc. IEEE Conf. Decision and Control, Atlanta, Dec. 2010*, page FrB14.3, 2010.

[184] E.D. Sontag. Remarks on structural identification, modularity, and retroactivity. In *Proc. IEEE Conf. Decision and Control, Atlanta, Dec. 2010*, page ThA23.1, 2010.

[185] E.D. Sontag. Rudolf E. Kalman and his students. *Control Systems Magazine*, 30:87–103, 2010.

[186] E.D. Sontag and D. Zeilberger. A symbolic computation approach to a problem involving multivariate Poisson distributions. *Advances in Applied Mathematics*, 44:359–377, 2010. There are a few typos in the published version. Please see this file for corrections: https://drive.google.com/file/d/0BzWFHczJF2INUlEtVkFJOUJiUFU/view.

[187] D. Angeli, P. de Leenheer, and E.D. Sontag. Persistence results for chemical reaction networks with time-dependent kinetics and no global conservation laws. *SIAM Journal on Applied Mathematics*, 71:128–146, 2011.

[188] D. Del Vecchio, A.J. Ninfa, and E.D. Sontag. Modular cell biology: Retroactivity and insulation. *Molecular Systems Biology*, 4:161, 2008.

[189] D. Del Vecchio and E.D. Sontag. Engineering principles in bio-molecular systems: From retroactivity to modularity. *European Journal of Control*, 15:389–397, 2009. Preliminary version appeared as paper MoB2.2 in Proceedings of the European Control Conference 2009, August 23-26, 2009, Budapest.

[190] D. Del Vecchio, A.J. Ninfa, and E.D. Sontag. A systems theory with retroactivity: Application to transcriptional modules. In *Proceedings of the 2008 American Control Conference, Seattle, June 2008*, page Paper WeC04.1, 2008.

[191] T. Riley, E.D. Sontag, P. Chen, and A. Levine. The transcriptional regulation of human p53-regulated genes. *Nature Reviews Molecular Cell Biology*, 9:402–412, 2008.

[192] D. Angeli, P. de Leenheer, and E.D. Sontag. Chemical networks with inflows and outflows: A positive linear differential inclusions approach. *Biotechnology Progress*, 25:632–642, 2009.

[193] E.D. Sontag. An observation regarding systems which converge to steady states for all constant inputs, yet become chaotic with periodic inputs. Technical report, arxiv 0906.2166, 2009.

[194] D. Angeli, P. de Leenheer, and E.D. Sontag. Graph-theoretic characterizations of monotonicity of chemical networks in reaction coordinates. *J. Mathematical Biology*, 61:581–616, 2010.

[195] E.D. Sontag. Contractive systems with inputs. In Jan Willems, Shinji Hara, Yoshito Ohta, and Hisaya Fujioka, editors, *Perspectives in Mathematical System Theory, Control, and Signal Processing*, pages 217–228. Springer-verlag, 2010.

[196] G. Russo, M. di Bernardo, and E.D. Sontag. Global entrainment of transcriptional systems to periodic inputs. *PLoS Computational Biology*, 6:e1000739, 2010.

[197] E.D. Sontag. Monotone and near-monotone biochemical networks. *Systems and Synthetic Biology*, 1:59–87, 2007.

[198] E.D. Sontag. Network reconstruction based on steady-state data. *Essays in Biochemistry*, 45:161–176, 2008.

[199] M. Chaves, A. M. Sengupta, and E.D. Sontag. Geometry and topology of parameter space: investigating measures of robustness in regulatory networks. *J. of Mathematical Biology*, 59:315–358, 2009.

[200] A. Dayarian, M. Chaves, E.D. Sontag, and A. M. Sengupta. Shape, size and robustness: Feasible regions in the parameter space of biochemical networks. *PLoS Computational Biology*, 5:e10000256, 2009.

[201] D. Del Vecchio and E.D. Sontag. Synthetic biology: A systems engineering perspective. In B.P. Ingalls and P. Iglesias, editors, *Control Theory in Systems Biology*, pages 101–123. MIT Press, 2009.

[202] D. Angeli and E.D. Sontag. Graphs and the dynamics of biochemical networks. In B.P. Ingalls and P. Iglesias, editors, *Control Theory in Systems Biology*, pages 125–142. MIT Press, 2009.

[203] E.D. Sontag. Remarks on feedforward circuits, adaptation, and pulse memory. *IET Systems Biology*, 4:39–51, 2010.

[204] L. Scardovi, M. Arcak, and E.D. Sontag. Synchronization of interconnected systems with applications to biochemical networks: an input-output approach. *IEEE Transactions Autom. Control*, 55:1367–1379, 2010.

[205] D. Angeli, P. de Leenheer, and E.D. Sontag. On persistence of chemical reaction networks with time-dependent kinetics and no global conservation laws. In *Proc. IEEE Conf. Decision and Control, Shanhai, Dec. 2009*, pages 4559–4564, 2009.

[206] L. Scardovi, M. Arcak, and E.D. Sontag. Synchronization of interconnected systems with an input-output approach. Part I: Main results. In *Proc. IEEE Conf. Decision and Control, Shanhai, Dec. 2009*, pages 609–614, 2009. First part of conference version of journal paper.

[207] L. Scardovi, M. Arcak, and E.D. Sontag. Synchronization of interconnected systems with an input-output approach. Part II: State-space result and application to biochemical networks. In *Proc. IEEE Conf. Decision and Control, Shanhai, Dec. 2009*, pages 615–620, 2009. Second part of conference version of journal paper.

[208] M. Arcak and E.D. Sontag. Passivity-based stability of interconnection structures. In V. Blondel, S. Boyd, and H. Kimura, editors, *Recent Advances in Learning and Control*, volume Volume 371, pages 195–204. Springer-Verlag, NY, 2008.

[209] L. Wang, P. de Leenheer, and E.D. Sontag. Conditions for global stability of monotone tridiagonal systems with negative feedback. *Systems and Control Letters*, 59:138–130, 2010.

[210] L. Wang, P. de Leenheer, and E.D. Sontag. Global stability for monotone tridiagonal systems with negative feedback. In *Proc. IEEE Conf. Decision and Control, Cancun, Dec. 2008*, pages 4091–4096, 2008.

[211] E.D. Sontag, Y. Wang, and A. Megretski. Input classes for identification of bilinear systems. *IEEE Transactions Autom. Control*, 54:195–207, 2009. Also arXiv math.OC/0610633, 20 Oct 2006, and short version in ACC'07.

[212] D. Angeli, M.W. Hirsch, and E.D. Sontag. Attractors in coherent systems of differential equations. *J. of Differential Equations*, 246:3058–3076, 2009.

[213] A.M. Weinstein and E.D. Sontag. Modeling proximal tubule cell homeostasis: Tracking changes in luminal flow. *Bulletin of Mathematical Biology*, 71:1285–1322, 2009.

[214] T. Riley, X. Yu, E.D. Sontag, and A. Levine. The P53HMM algorithm: using novel profile Hidden Markov Models to detect p53-responsive genes. *BMC Bioinformatics*, 10:111, 2009.

[215] B. Andrews, E.D. Sontag, and P. Iglesias. An approximate internal model principle: Applications to nonlinear models of biological systems. In *Proc. 17th IFAC World Congress, Seoul*, pages Paper FrB25.3, 6 pages, 2008.

[216] E.D. Sontag, A. Veliz-Cuba, R. Laubenbacher, and A.S. Jarrah. The effect of negative feedback loops on the dynamics of boolean networks. *Biophysical Journal*, 95:518–526, 2008.

[217] W. Maass, P. Joshi, and E.D. Sontag. Computational aspects of feedback in neural circuits. *PLoS Computational Biology*, 3:e165 1–20, 2007.

[218] E.D. Sontag. Input to state stability: Basic concepts and results. In P. Nistri and G. Stefani, editors, *Nonlinear and Optimal Control Theory*, pages 163–220. Springer-Verlag, Berlin, 2007.

[219] S. Kachalo, R. Zhang, E.D. Sontag, R. Albert, and B. Dasgupta. Net-synthesis: A software for synthesis, inference and simplification of signal transduction networks. *Bioinformatics*, 24:293 – 295, 2008.

[220] R. Albert, B. Dasgupta, and E.D. Sontag. Inference of signal transduction networks from double causal evidence. In David Fenyö, editor, *Computational Biology, Methods in Molecular Biology vol. 673*, pages 239–251. Springer, 2010.

[221] R. Albert, B. DasGupta, R. Dondi, S. Kachalo, E.D. Sontag, A. Zelikovsky, and K. Westbrooks. A novel method for signal transduction network inference from indirect experimental evidence. *Journal of Computational Biology*, 14:927–949, 2007.

[222] R. Albert, B. Dasgupta, R. Dondi, and E.D. Sontag. Inferring (biological) signal transduction networks via transitive reductions of directed graphs. *Algorithmica*, 51:129–159, 2008.

[223] R. Albert, B. DasGupta, R. Dondi, S. Kachalo, E.D. Sontag, A. Zelikovsky, and K. Westbrooks. A novel method for signal transduction network inference from indirect experimental evidence. In R. Giancarlo and S. Hannenhalli, editors, *7th Workshop on Algorithms in Bioinformatics (WABI)*, volume 14, pages 407–419. Springer-Verlag, Berlin, 2007. Conference version of journal paper with same title.

[224] D. Angeli and E.D. Sontag. Oscillations in i/o monotone systems. *IEEE Transactions on Circuits and Systems, Special Issue on Systems Biology*, 55:166–176, 2008. Preprint version in arXiv q-bio.QM/0701018, 14 Jan 2007.

[225] M. Chaves, E.D. Sontag, and R. Albert. Methods of robustness analysis for Boolean models of gene control networks. *IET Systems Biology*, 153:154–167, 2006.

[226] M. Arcak and E.D. Sontag. A passivity-based stability criterion for a class of interconnected systems and applications to biochemical reaction networks. *Mathematical Biosciences and Engineering*, 5:1–19, 2008. Also, preprint: arxiv0705.3188v1 [q-bio], May 2007.

[227] M. Arcak and E.D. Sontag. A passivity-based stability criterion for a class of interconnected systems and applications to biochemical reaction networks. In *Proc. IEEE Conf. Decision and Control, New Orleans, Dec. 2007*, pages 4477–4482, 2007. Conference version of journal paper with same title.

[228] A. Maayan, R. Iyengar, and E.D. Sontag. Intracellular regulatory networks are close to monotone systems. *IET Systems Biology*, 2:103–112, 2008.

[229] G.A. Enciso, H.L. Smith, and E.D. Sontag. Non-monotone systems decomposable into monotone systems with negative feedback. *J. of Differential Equations*, 224:205–227, 2006.

[230] E.D. Sontag and Y. Wang. Uniformly universal inputs. In Alessandro Astolfi, editor, *Analysis and Design of Nonlinear Control Systems*, volume 224, pages 9–24. Springer-Verlag, London, 2007.

[231] D. Del Vecchio and E.D. Sontag. Dynamics and control of synthetic bio-molecular networks. In *Proceedings American Control Conf., New York, July 2007*, pages 1577–1588, 2007.

[232] P. Berman, B. Dasgupta, and E.D. Sontag. Algorithmic issues in reverse engineering of protein and gene networks via the modular response analysis method. *Annals of the NY Academy of Sciences*, 1115:132–141, 2007.

[233] L. Wang and E.D. Sontag. Singularly perturbed monotone systems and an application to double phosphorylation cycles. *J. Nonlinear Science*, 18:527–550, 2008.

[234] L. Wang and E.D. Sontag. On the number of steady states in a multiple futile cycle. *Journal of Mathematical Biology*, 57:29–52, 2008.

[235] E.D. Sontag. Monotone and near-monotone systems. In I. Queinnec, S. Tarbouriech, G. Garcia, and S-I. Niculescu, editors, *Biology and Control Theory: Current Challenges (Lecture Notes in Control and Information Sciences Volume 357)*, pages 79–122. Springer-Verlag, Berlin, 2007. Conference version of "Monotone and near-monotone biochemical networks," basically the same paper.

[236] D. Angeli and E.D. Sontag. Translation-invariant monotone systems, and a global convergence result for enzymatic futile cycles. *Nonlinear Analysis Series B: Real World Applications*, 9:128–140, 2008.

[237] D. Angeli, P. de Leenheer, and E.D. Sontag. A Petri net approach to the study of persistence in chemical reaction networks. *Mathematical Biosciences*, 210:598–618, 2007. Please look at the paper "A Petri net approach to persistence analysis in chemical reaction networks" for additional results, not included in the journal paper due to lack of space. See also the preprint: arXiv q-bio.MN/068019v2, 10 Aug 2006.

[238] D. Angeli, P. de Leenheer, and E.D. Sontag. Petri nets tools for the analysis of persistence in chemical networks. In *Proc. 7th IFAC Symposium on Nonlinear Control Systems (NOLCOS 2007), Pretoria, South Africa, 22-24 August, 2007*, 2007.

[239] D. Angeli, P. De Leenheer, and E.D. Sontag. A Petri net approach to persistence analysis in chemical reaction networks. In I. Queinnec, S. Tarbouriech, G. Garcia, and S-I. Niculescu, editors, *Biology and Control Theory: Current Challenges (Lecture Notes in Control and Information Sciences Volume 357)*, pages 181–216. Springer-Verlag, Berlin, 2007. See abstract for "A Petri net approach to the study of persistence in chemical reaction networks".

[240] B. DasGupta, G.A. Enciso, E.D. Sontag, and Y. Zhang. Algorithmic and complexity aspects of decompositions of biological networks into monotone subsystems. *BioSystems*, 90:161–178, 2007.

[241] E.D. Sontag. Passivity gains and the "secant condition" for stability. *Systems Control Lett.*, 55(3):177–183, 2006.

[242] M. Chaves and E.D. Sontag. Exact computation of amplification for a class of nonlinear systems arising from cellular signaling pathways. *Automatica*, 42:1987–1992, 2006.

[243] M.R. Jovanović, M. Arcak, and E.D. Sontag. A passivity-based approach to stability of spatially distributed systems with a cyclic interconnection structure. *IEEE Transactions on Circuits and Systems, Special Issue on Systems Biology*, 55:75–86, 2008. Preprint: also arXiv math.OC/0701622, 22 January 2007.

[244] L. Wang and E.D. Sontag. Further results on singularly perturbed monotone systems, with an application to double phosphorylation cycles. In *Proc. IEEE Conf. Decision and Control, New Orleans, Dec. 2007*, pages 627–632, 2007. Conference version of "Singularly perturbed monotone systems and an application to double phosphorylation cycles".

[245] E.D. Sontag and Y. Wang. A cooperative system which does not satisfy the limit set dichotomy. *J. of Differential Equations*, 224:373–384, 2006.

[246] G.A. Enciso and E.D. Sontag. Global attractivity, I/O monotone small-gain theorems, and biological delay systems. *Discrete Contin. Dyn. Syst.*, 14(3):549–578, 2006.

[247] N.A.W. van Riel and E.D. Sontag. Parameter estimation in models combining signal transduction and metabolic pathways: The dependent input approach. *IET Systems Biology*, 153:263–274, 2006.

[248] B. Dasgupta, G.A. Enciso, E.D. Sontag, and Y. Zhang. Algorithmic and complexity results for decompositions of biological networks into monotone subsystems. In C. Àlvarez and M. Serna, editors, *Lecture Notes in Computer Science: Experimental Algorithms: 5th International Workshop, WEA 2006*, pages 253–264. Springer-Verlag, 2006. (Cala Galdana, Menorca, Spain, May 24-27, 2006).

[249] M. Malisoff, M. Krichman, and E.D. Sontag. Global stabilization for systems evolving on manifolds. *Journal of Dynamical and Control Systems*, 12:161–184, 2006.

[250] P. de Leenheer, S.A. Levin, E.D. Sontag, and C.A. Klausmeier. Global stability in a chemostat with multiple nutrients. *J. Mathematical Biology*, 52:419–438, 2006.

[251] B. DasGupta, J.P. Hespanha, J. Riehl, and E.D. Sontag. Honey-pot constrained searching with local sensory information. *Nonlinear Analysis*, 65:1773–1793, 2006.

[252] P. de Leenheer, D. Angeli, and E.D. Sontag. Crowding effects promote coexistence in the chemostat. *Journal of Mathematical Analysis and Applications*, 319:48–60, 2006.

[253] T. Gedeon and E.D. Sontag. Oscillations in multi-stable monotone systems with slowly varying feedback. *J. of Differential Equations*, 239:273–295, 2007.

[254] E.D. Sontag. Stability and feedback stabilization. In Robert Meyers, editor, *Encyclopedia of Complexity and Systems Science*. Springer-Verlag, Berlin, 2007.

[255] E.D. Sontag. Molecular systems biology and control. *Eur. J. Control*, 11(4-5):396–435, 2005.

[256] M. Chaves, R. Albert, and E.D. Sontag. Robustness and fragility of Boolean models for genetic regulatory networks. *J. Theoret. Biol.*, 235(3):431–449, 2005.

[257] J. L. Mancilla-Aguilar, R. García, E.D. Sontag, and Y. Wang. Uniform stability properties of switched systems with switchings governed by digraphs. *Nonlinear Anal.*, 63(3):472–490, 2005.

[258] J. L. Mancilla-Aguilar, R. García, E.D. Sontag, and Y. Wang. On the representation of switched systems with inputs by perturbed control systems. *Nonlinear Anal.*, 60(6):1111–1150, 2005.

[259] D. Angeli, P. de Leenheer, and E.D. Sontag. On the structural monotonicity of chemical reaction networks. In *Proc. IEEE Conf. Decision and Control, San Diego, Dec. 2006*, pages 7–12. IEEE, 2006.

[260] M. Chaves, E.D. Sontag, and R. Albert. Structure and timescale analysis in genetic regulatory networks. In *Proc. IEEE Conf. Decision and Control, San Diego, Dec. 2006*, pages 2358–2363. IEEE, 2006.

[261] B. Andrews, P. Iglesias, and E.D. Sontag. Signal detection and approximate adaptation implies an approximate internal model. In *Proc. IEEE Conf. Decision and Control, San Diego, Dec. 2006*, pages 2364–2369. IEEE, 2006.

[262] L. Wang and E.D. Sontag. Almost global convergence in singular perturbations of strongly monotone systems. In C. Commault and N. Marchand, editors, *Positive Systems*, pages 415–422. Springer-Verlag, Berlin/Heidelberg, 2006. (Lecture Notes in Control and Information Sciences Volume 341, Proceedings of the second Multidisciplinary International Symposium on Positive Systems: Theory and Applications (POSTA 06) Grenoble, France).

[263] L. Wang and E.D. Sontag. A remark on singular perturbations of strongly monotone systems. In *Proc. IEEE Conf. Decision and Control, San Diego, Dec. 2006*, pages 989–994. IEEE, 2006.

[264] D. Angeli and E.D. Sontag. A note on monotone systems with positive translation invariance. In *Control and Automation, 2006. MED '06. 14th Mediterranean Conference on, 28-30 June 2006*, pages 1–6. IEEE, 2006. available from ieeexplore.ieee.org.

[265] E.D. Sontag, Y. Wang, and A. Megretski. Remarks on input classes for identification of bilinear systems. In *Proceedings American Control Conf., New York, July 2007*, pages 4345–4350, 2007.

[266] M.R. Jovanović, M. Arcak, and E.D. Sontag. Remarks on the stability of spatially distributed systems with a cyclic interconnection structure. In *Proceedings American Control Conf., New York, July 2007*, pages 2696–2701, 2007.

[267] W. Maass, P. Joshi, and E.D. Sontag. Principles of real-time computing with feedback applied to cortical microcircuit models. In *Advances in Neural Information Processing Systems 18*. MIT Press, Cambridge, 2006.

[268] M. Arcak and E.D. Sontag. Diagonal stability of a class of cyclic systems and its connection with the secant criterion. *Automatica*, 42:1531–1537, 2006.

[269] B. Dasgupta, P. Berman, and E.D. Sontag. Computational complexities of combinatorial problems with applications to reverse engineering of biological networks. In D. Liu and F-Y. Wan, editors, *Advances in Computational Intelligence: Theory & Applications*, pages 303–316. World Scientific, Hackensack, 2006.

[270] M. Arcak and E.D. Sontag. Connections between diagonal stability and the secant condition for cyclic systems. In *Proc. American Control Conference, Minneapolis, June 2006*, pages 1493–1498, 2006.

[271] P. Berman, B. Dasgupta, and E.D. Sontag. Randomized approximation algorithms for set multicover problems with applications to reverse engineering of protein and gene networks. *Discrete Applied Mathematics Special Series on Computational Molecular Biology*, 155:733–749, 2007.

[272] G.A. Enciso and E.D. Sontag. Monotone bifurcation graphs. *Journal of Biological Dynamics*, 2:121–139, 2008.

[273] E.P. Ryan and E.D. Sontag. Well-defined steady-state response does not imply cics. *Systems and Control Letters*, 55:707–710, 2006.

[274] P. de Leenheer, D. Angeli, and E.D. Sontag. Monotone chemical reaction networks. *J. Math Chemistry*, 41:295–314, 2007.

[275] G.A. Enciso and E.D. Sontag. Monotone systems under positive feedback: multistability and a reduction theorem. *Systems Control Lett.*, 54(2):159–168, 2005.

[276] M. Andrec, B.N. Kholodenko, R.M. Levy, and E.D. Sontag. Inference of signaling and gene regulatory networks by steady-state perturbation experiments: structure and accuracy. *J. Theoret. Biol.*, 232(3):427–441, 2005. Supplementary materials are here: http://sontaglab.org/FTPDIR/andrec-kholodenko-levy-sontag-JTB04-supplementary.pdf.

[277] J.P. Hespanha, D. Liberzon, D. Angeli, and E.D. Sontag. Nonlinear norm-observability notions and stability of switched systems. *IEEE Trans. Automat. Control*, 50(2):154–168, 2005.

[278] P. de Leenheer, D. Angeli, and E.D. Sontag. On predator-prey systems and small-gain theorems. *Math. Biosci. Eng.*, 2(1):25–42, 2005.

[279] G.A. Enciso and E.D. Sontag. A remark on multistability for monotone systems ii. In *Proc. IEEE Conf. Decision and Control, Seville, Dec. 2005, IEEE Publications*, pages 2957–2962, 2005.

[280] E.D. Sontag. A notion of passivity gain and a generalization of the 'secant condition' for stability. In *Proc. IEEE Conf. Decision and Control, Seville, Dec. 2005, IEEE Publications*, pages 5645–5649, 2005.

[281] E.D. Sontag and M. Chaves. Computation of amplification for systems arising from cellular signaling pathways. In *Proc. 16th IFAC World Congress, Prague, July 2005*, 2005.

[282] E.D. Sontag. Some new directions in control theory inspired by systems biology. *IET Systems Biology*, 1:9–18, 2004.

[283] D. Angeli, J. E. Ferrell, and E.D. Sontag. Detection of multistability, bifurcations, and hysteresis in a large class of biological positive-feedback systems. *Proc Natl Acad Sci USA*, 101(7):1822–1827, 2004. A revision of Suppl. Fig. 7(b) is here: http://sontaglab.org/FTPDIR/nullclines-f-g-REV.jpg; and typos can be found here: http://sontaglab.org/FTPDIR/angeli-ferrell-sontag-pnas04-errata.txt.

[284] D. Angeli and E.D. Sontag. Multi-stability in monotone input/output systems. *Systems Control Lett.*, 51(3-4):185–202, 2004.

[285] M. Chaves, E.D. Sontag, and R. J. Dinerstein. Steady-states of receptor-ligand dynamics: A theoretical framework. *J. Theoret. Biol.*, 227(3):413–428, 2004.

[286] G.A. Enciso and E.D. Sontag. On the stability of a model of testosterone dynamics. *J. Math. Biol.*, 49(6):627–634, 2004.

[287] M. Chaves, R.J. Dinerstein, and E.D. Sontag. Optimal length and signal amplification in weakly activated signal transduction cascades. *J. Physical Chemistry*, 108:15311–15320, 2004.

[288] E.D. Sontag, A. Kiyatkin, and B.N. Kholodenko. Inferring dynamic architecture of cellular networks using time series of gene expression, protein and metabolite data. *Bioinformatics*, 20(12):1877–1886, 2004. Supplementary materials are here: http://sontaglab.org/FTPDIR/sontag-kiyatkin-kholodenko-informatics04-supplement.pdf.

[289] D. Angeli and E.D. Sontag. An analysis of a circadian model using the small-gain approach to monotone systems. In *Proc. IEEE Conf. Decision and Control, Paradise Island, Bahamas, Dec. 2004, IEEE Publications*, pages 575–578, 2004.

[290] M. Chaves, E.D. Sontag, and R.J. Dinerstein. Gains and optimal design in signaling pathways. In *Proc. IEEE Conf. Decision and Control, Paradise Island, Bahamas, Dec. 2004, IEEE Publications*, pages 596–601, 2004.

[291] D. Angeli, B.P. Ingalls, E.D. Sontag, and Y. Wang. Uniform global asymptotic stability of differential inclusions. *J. Dynam. Control Systems*, 10(3):391–412, 2004.

[292] M. Malisoff, L. Rifford, and E.D. Sontag. Global asymptotic controllability implies input-to-state stabilization. *SIAM J. Control Optim.*, 42(6):2221–2238, 2004.

[293] D. Angeli, B.P. Ingalls, E.D. Sontag, and Y. Wang. Separation principles for input-output and integral-input-to-state stability. *SIAM J. Control Optim.*, 43(1):256–276, 2004.

[294] P. Kuusela, D. Ocone, and E.D. Sontag. Learning complexity dimensions for a continuous-time control system. *SIAM J. Control Optim.*, 43(3):872–898, 2004.

[295] M. Malisoff and E.D. Sontag. Asymptotic controllability and input-to-state stabilization: the effect of actuator errors. In *Optimal control, stabilization and nonsmooth analysis*, volume 301 of *Lecture Notes in Control and Inform. Sci.*, pages 155–171. Springer, Berlin, 2004.

[296] D. Angeli and E.D. Sontag. Interconnections of monotone systems with steady-state characteristics. In *Optimal control, stabilization and nonsmooth analysis*, volume 301 of *Lecture Notes in Control and Inform. Sci.*, pages 135–154. Springer, Berlin, 2004.

[297] D. Angeli, P. de Leenheer, and E.D. Sontag. A small-gain theorem for almost global convergence of monotone systems. *Systems Control Lett.*, 52(5):407–414, 2004.

[298] D. Angeli, P. de Leenheer, and E.D. Sontag. A tutorial on monotone systems- with an application to chemical reaction networks. In *Proc. 16th Int. Symp. Mathematical Theory of Networks and Systems (MTNS 2004), CD-ROM, WP9.1, Katholieke Universiteit Leuven*, 2004.

[299] B. DasGupta, J.P. Hespanha, and E.D. Sontag. Aggregation-based approaches to honey-pot searching with local sensory information. In *Proceedings American Control Conf., Boston, June 2004*, 2004.

[300] B. DasGupta, J.P. Hespanha, and E.D. Sontag. Computational complexities of honey-pot searching with local sensory information. In *Proceedings American Control Conf., Boston, June 2004, CD-ROM, ThA06.1, IEEE Publications, Piscataway*, 2004.

[301] J.L. Mancilla-Aguilar, R. García, E.D. Sontag, and Y. Wang. Representation of switched systems by perturbed control systems. In *Proc. IEEE Conf. Decision and Control, Paradise Island, Bahamas, Dec. 2004, IEEE Publications*, pages 3259–3264, 2004.

[302] G.A. Enciso and E.D. Sontag. A remark on multistability for monotone systems. In *Proc. IEEE Conf. Decision and Control, Paradise Island, Bahamas, Dec. 2004, IEEE Publications*, pages 249–254, 2004.

[303] D. Angeli, P. de Leenheer, and E.D. Sontag. Remarks on monotonicity and convergence in chemical reaction networks. In *Proc. IEEE Conf. Decision and Control, Paradise Island, Bahamas, Dec. 2004, IEEE Publications*, pages 243–248, 2004.

[304] L. Moreau and E.D. Sontag. Balancing at the border of instability. *Phys. Rev. E (3)*, 68(2):020901, 4, 2003.

[305] L. Moreau, E.D. Sontag, and M. Arcak. Feedback tuning of bifurcations. *Systems Control Lett.*, 50(3):229–239, 2003.

[306] L. Moreau, E.D. Sontag, and M. Arcak. How feedback can tune a bifurcation parameter towards its unknown critical bifurcation value. In *Proc. IEEE Conf. Decision and Control, Maui, Dec. 2003, IEEE Publications, 2003*, pages 2401–2406, 2003.

[307] D. Angeli and E.D. Sontag. Monotone control systems. *IEEE Trans. Automat. Control*, 48(10):1684–1698, 2003. Errata are here: http://sontaglab.org/FTPDIR/angeli-sontag-monotone-TAC03-typos.txt.

[308] J. R. Pomerening, E.D. Sontag, and J. E. Ferrell. Building a cell cycle oscillator: hysteresis and bistability in the activation of cdc2. *Nature Cell Biology*, 5(4):346–351, 2003. Supplementary materials 2-4 are here: http://sontaglab.org/FTPDIR/pomerening-sontag-ferrell-additional.pdf.

[309] B.P. Ingalls, E.D. Sontag, and Y. Wang. An infinite-time relaxation theorem for differential inclusions. *Proc. Amer. Math. Soc.*, 131(2):487–499, 2003.

[310] P. de Leenheer, D. Angeli, and E.D. Sontag. A feedback perspective for chemostat models with crowding effects. In *Positive systems (Rome, 2003)*, volume 294 of *Lecture Notes in Control and Inform. Sci.*, pages 167–174. Springer, Berlin, 2003.

[311] P. de Leenheer, D. Angeli, and E.D. Sontag. Small-gain theorems for predator-prey systems. In *Positive systems (Rome, 2003)*, volume 294 of *Lecture Notes in Control and Inform. Sci.*, pages 191–198. Springer, Berlin, 2003.

[312] M. Malisoff, L. Rifford, and E.D. Sontag. Remarks on input to state stabilization. In *Proc. IEEE Conf. Decision and Control, Maui, Dec. 2003, IEEE Publications, 2003*, pages 1053–1058, 2003.

[313] E.D. Sontag and M. Krichman. An example of a GAS system which can be destabilized by an integrable perturbation. *IEEE Trans. Automat. Control*, 48(6):1046–1049, 2003.

[314] E.D. Sontag. Adaptation and regulation with signal detection implies internal model. *Systems Control Lett.*, 50(2):119–126, 2003.

[315] D. Angeli, E.D. Sontag, and Y. Wang. Input-to-state stability with respect to inputs and their derivatives. *Internat. J. Robust Nonlinear Control*, 13(11):1035–1056, 2003.

[316] E.D. Sontag. A remark on the converging-input converging-state property. *IEEE Trans. Automat. Control*, 48(2):313–314, 2003.

[317] M. Chyba, N. E. Leonard, and E.D. Sontag. Singular trajectories in multi-input time-optimal problems: Application to controlled mechanical systems. *Journal of Dynamical and Control Systems*, 9(1):103–129, 2003.

[318] D. Angeli and E.D. Sontag. A note on multistability and monotone i/o systems. In *Proc. IEEE Conf. Decision and Control, Maui, Dec. 2003, IEEE Publications, 2003*, pages 67–72, 2003.

[319] B.N. Kholodenko, A. Kiyatkin, F.J. Bruggeman, E.D. Sontag, H.V. Westerhoff, and J. Hoek. Untangling the wires: a novel strategy to trace functional interactions in signaling and gene networks. *Proceedings of the National Academy of Sciences USA*, 99:12841–12846, 2002.

[320] E.D. Sontag and B.P. Ingalls. A small-gain theorem with applications to input/output systems, incremental stability, detectability, and interconnections. *J. Franklin Inst.*, 339(2):211–229, 2002.

[321] D. Liberzon, A. S. Morse, and E.D. Sontag. Output-input stability and minimum-phase nonlinear systems. *IEEE Trans. Automat. Control*, 47(3):422–436, 2002.

[322] D. Liberzon, E.D. Sontag, and Y. Wang. Universal construction of feedback laws achieving ISS and integral-ISS disturbance attenuation. *Systems Control Lett.*, 46(2):111–127, 2002. Errata here: http://sontaglab.org/FTPDIR/iiss-clf-errata.pdf.

[323] M. Krichman and E.D. Sontag. Characterizations of detectability notions in terms of discontinuous dissipation functions. *Internat. J. Control*, 75(12):882–900, 2002.

[324] E.D. Sontag. For differential equations with r parameters, 2r+1 experiments are enough for identification. *J. Nonlinear Sci.*, 12(6):553–583, 2002.

[325] M. Chaves and E.D. Sontag. State-estimators for chemical reaction networks of Feinberg-Horn-Jackson zero deficiency type. *European J. Control*, 8:343–359, 2002.

[326] M. Arcak, D. Angeli, and E.D. Sontag. A unifying integral ISS framework for stability of nonlinear cascades. *SIAM J. Control Optim.*, 40(6):1888–1904, 2002.

[327] B.P. Ingalls, E.D. Sontag, and Y. Wang. A relaxation theorem for differential inclusions with applications to stability properties. In D. Gilliam and J. Rosenthal, editors, *Mathematical Theory of Networks and Systems, Electronic Proceedings of MTNS-2002 Symposium held at the University of Notre Dame, August 2002*, 2002. (12 pages).

[328] D. Angeli and E.D. Sontag. A remark on monotone control systems. In *Proc. IEEE Conf. Decision and Control, Las Vegas, Dec. 2002, IEEE Publications*, pages 1876–1881, 2002.

[329] B.P. Ingalls, E.D. Sontag, and Y. Wang. Measurement to error stability: a notion of partial detectability for nonlinear systems. In *Proc. IEEE Conf. Decision and Control, Las Vegas, Dec. 2002, IEEE Publications*, pages 3946–3951, 2002.

[330] J.P. Hespanha, D. Liberzon, and E.D. Sontag. Nonlinear observability and an invariance principle for switched systems. In *Proc. IEEE Conf. Decision and Control, Las Vegas, Dec. 2002, IEEE Publications*, pages 4300–4305, 2002.

[331] E.D. Sontag. Asymptotic amplitudes, cauchy gains, an associated small-gain principle, and an application to inhibitory biological feedback. In *Proc. IEEE Conf. Decision and Control, Las Vegas, Dec. 2002, IEEE Publications*, pages 4318–4323, 2002.

[332] E.D. Sontag. Asymptotic amplitudes and Cauchy gains: A small-gain principle and an application to inhibitory biological feedback. *Systems Control Lett.*, 47(2):167–179, 2002.

[333] A. C. Antoulas, E. D. Sontag, and Y. Yamamoto. *Controllability and Observability*, pages 264–281. John Wiley & Sons, Inc., 2001.

[334] W. Desch, H. Logemann, E. P. Ryan, and E.D. Sontag. Meagre functions and asymptotic behaviour of dynamical systems. *Nonlinear Anal.*, 44(8, Ser. A: Theory Methods):1087–1109, 2001.

[335] E.D. Sontag and Y. Wang. Lyapunov characterizations of input to output stability. *SIAM J. Control Optim.*, 39(1):226–249, 2000.

[336] M. Krichman, E.D. Sontag, and Y. Wang. Input-output-to-state stability. *SIAM J. Control Optim.*, 39(6):1874–1928, 2001.

[337] B. DasGupta and E.D. Sontag. A polynomial-time algorithm for checking equivalence under certain semiring congruences motivated by the state-space isomorphism problem for hybrid systems. *Theor. Comput. Sci.*, 262(1-2):161–189, 2001.

[338] E.D. Sontag. Structure and stability of certain chemical networks and applications to the kinetic proofreading model of T-cell receptor signal transduction. *IEEE Trans. Automat. Control*, 46(7):1028–1047, 2001.

[339] E.D. Sontag. Correction to: "Structure and stability of certain chemical networks and applications to the kinetic proofreading model of T-cell receptor signal transduction" [IEEE Trans. Automat. Control **46** (2001), no. 7, 1028–1047; MR1842137 (2002e:92006)]. *IEEE Trans. Automat. Control*, 47(4):705, 2002.

[340] D. Liberzon, A.S. Morse, and E.D. Sontag. Output-input stability: a new variant of the minimum-phase property for nonlinear systems. In *Proc. Nonlinear Control System Design Symposium, St. Petersburg, July 2001*, pages 743–748, 2001.

[341] D. Angeli, E.D. Sontag, and Y. Wang. A note on input-to-state stability with input derivatives. In *Proc. Nonlinear Control System Design Symposium, St. Petersburg, July 2001*, pages 720–725, 2001.

[342] M. Chaves and E.D. Sontag. An alternative observer for zero deficiency chemical networks. In *Proc. Nonlinear Control System Design Symposium, St. Petersburg, July 2001*, pages 575–578, 2001.

[343] P. Kuusela, D. Ocone, and E.D. Sontag. Remarks on the sample complexity for linear control systems identification. In *IFAC Workshop on Adaptation and Learning in Control and Signal Processing, ALCOSP2001, Cernobbio-Como, Italy, 29-31 August, 2001*, pages 431–436, 2001.

[344] M. Chaves and E.D. Sontag. Observers for certain chemical reaction networks. In *Proc. 2001 European Control Conf., Sep. 2001*, pages 3715–3720, 2001.

[345] M. Chyba, N.E. Leonard, and E.D. Sontag. Optimality for underwater vehicles. In *Proc. IEEE Conf. Decision and Control, Orlando, Dec. 2001,IEEE Publications, 2001*, pages 4204–4209, 2001.

[346] M. Arcak, D. Angeli, and E.D. Sontag. Stabilization of cascades using integral input-to-state stability. In *Proc. IEEE Conf. Decision and Control, Orlando, Dec. 2001, IEEE Publications, 2001*, pages 3814–3819, 2001.

[347] B.P. Ingalls, D. Angeli, E.D. Sontag, and Y. Wang. Asymptotic characterizations of ioss. In *Proc. IEEE Conf. Decision and Control, Orlando, Dec. 2001, IEEE Publications, 2001*, pages 881–886, 2001.

[348] E.D. Sontag, B.P. Ingalls, and Y. Wang. Generalizations of asymptotic gain characterizations of ISS to input-to-output stability. In Proc. American Control Conf., *Arlington, June 2001*, pages 2279–2284, 2001.

[349] M. Malisoff and E.D. Sontag. Universal formulas for feedback stabilization with respect to Minkowski balls. *Systems Control Lett.*, 40(4):247–260, 2000.

[350] W. Maass and E.D. Sontag. Neural systems as nonlinear filters. *Neural Comput.*, 12(8):1743–1772, 2000.

[351] X. Bao, Z. Lin, and E.D. Sontag. Finite gain stabilization of discrete-time linear systems subject to actuator saturation. *Automatica*, 36(2):269–277, 2000.

[352] L. Rosier and E.D. Sontag. Remarks regarding the gap between continuous, Lipschitz, and differentiable storage functions for dissipation inequalities appearing in h infinity control. *Systems Control Lett.*, 41(4):237–249, 2000.

[353] M. Chyba, N.E. Leonard, and E.D. Sontag. Time-optimal control for underwater vehicles. In N.E. Leonard and R. Ortega, editors, Lagrangian and Hamiltonian Methods for Nonlinear Control, pages 117–122. Pergamon Press, Oxford, 2000.

[354] D. Angeli, E.D. Sontag, and Y. Wang. Further equivalences and semiglobal versions of integral input to state stability. *Dynamics and Control*, 10(2):127–149, 2000.

[355] D. Angeli, E.D. Sontag, and Y. Wang. A characterization of integral input-to-state stability. *IEEE Trans. Automat. Control*, 45(6):1082–1097, 2000.

[356] E.D. Sontag. The ISS philosophy as a unifying framework for stability-like behavior. In *Nonlinear control in the year 2000, Vol. 2 (Paris)*, volume 259 of *Lecture Notes in Control and Inform. Sci.*, pages 443–467. Springer, London, 2001.

[357] L. Grüne, E.D. Sontag, and F.R. Wirth. On equivalence of exponential and asymptotic stability under changes of variables. In *International Conference on Differential Equations, Vol. 1, 2 (Berlin, 1999)*, pages 850–852. World Sci. Publishing, River Edge, NJ, 2000.

[358] T. Natschläger, W. Maass, E.D. Sontag, and A. Zador. Processing of time series by neural circuits with biologically realistic synaptic dynamics. In Todd K. Leen, T. G. Dietterich, and V. Tresp, editors, *Advances in Neural Information Processing Systems 13 (NIPS2000)*, pages 145–151. MIT Press, Cambridge, 2000.

[359] D. Liberzon, A.S. Morse, and E.D. Sontag. A new definition of the minimum-phase property for nonlinear systems, with an application to adaptive control. In *Proc. IEEE Conf. Decision and Control, Sydney, Dec. 2000, IEEE Publications, 2000*, pages 2106–2111, 2000.

[360] Y.S. Ledyaev and E.D. Sontag. A Lyapunov characterization of robust stabilization. *Nonlinear Anal.*, 37(7, Ser. A: Theory Methods):813–840, 1999.

[361] D. Angeli and E.D. Sontag. Forward completeness, unboundedness observability, and their Lyapunov characterizations. *Systems Control Lett.*, 38(4-5):209–217, 1999.

[362] E.D. Sontag and Y. Qiao. Further results on controllability of recurrent neural networks. *Systems Control Lett.*, 36(2):121–129, 1999.

[363] E.D. Sontag. Control-Lyapunov functions. In *Open problems in mathematical systems and control theory*, Comm. Control Engrg. Ser., pages 211–216. Springer, London, 1999.

[364] V.D. Blondel, E.D Sontag, M. Vidyasagar, and J.C. Willems. *Open Problems in Mathematical Systems and Control Theory (edited book)*. Springer Verlag, 1999.

[365] D. Nešić, A.R. Teel, and E.D. Sontag. Formulas relating kl stability estimates of discrete-time and sampled-data nonlinear systems. *Systems Control Lett.*, 38(1):49–60, 1999.

[366] W. Maass and E.D. Sontag. Analog neural nets with gaussian or other common noise distributions cannot recognize arbitrary regular languages. *Neural Comput.*, 11(3):771–782, 1999.

[367] E.D. Sontag and Y. Wang. Notions of input to output stability. *Systems Control Lett.*, 38(4-5):235–248, 1999.

[368] L. Grüne, E.D. Sontag, and F.R. Wirth. Asymptotic stability equals exponential stability, and ISS equals finite energy gain—if you twist your eyes. *Systems Control Lett.*, 38(2):127–134, 1999.

[369] E.D. Sontag. Clocks and insensitivity to small measurement errors. *ESAIM Control Optim. Calc. Var.*, 4:537–557, 1999.

[370] F. Albertini and E.D. Sontag. Continuous control-Lyapunov functions for asymptotically controllable time-varying systems. *Internat. J. Control*, 72(18):1630–1641, 1999.

[371] Z-P. Jiang, E.D. Sontag, and Y. Wang. Input-to-state stability for discrete-time nonlinear systems. In *Proc. 14th IFAC World Congress, Vol E (Beijing)*, pages 277–282, 1999.

[372] D. Angeli and E.D. Sontag. Characterizations of forward completeness. In *Proc. IEEE Conf. Decision and Control, Phoenix, Dec. 1999, IEEE Publications, 1999*, pages 2551–2556, 1999.

[373] M. Krichman, E.D. Sontag, and Y. Wang. Lyapunov characterizations of input-ouput-to-state stability. In *Proc. IEEE Conf. Decision and Control, Phoenix, Dec. 1999, IEEE Publications, 1999*, pages 2070–2075, 1999.

[374] B.P. Ingalls, E.D. Sontag, and Y. Wang. Remarks on input to output stability. In *Proc. IEEE Conf. Decision and Control, Phoenix, Dec. 1999, IEEE Publications, 1999*, pages 1226–1231, 1999.

[375] L. Grune, E.D. Sontag, and F.R. Wirth. On the equivalence between asymptotic and exponential stability, and between ISS and finite h infinity gain. In *Proc. IEEE Conf. Decision and Control, Phoenix, Dec. 1999, IEEE Publications, 1999*, pages 1220–1225, 1999.

[376] E.D. Sontag. Feedback insensitive to small measurement errors. In *Proc. IEEE Conf. Decision and Control, Phoenix, Dec. 1999, IEEE Publications, 1999*, pages 2661–2666, 1999.

[377] D. Nešić, A.R. Teel, and E.D. Sontag. On stability and input-to-state stability $\|\updownarrow$ estimates of discrete-time and sampled-data nonlinear systems. In *Proc. American Control Conf., San Diego, June 1999*, pages 3990–3994, 1999.

[378] M. Malisoff and E.D. Sontag. Universal formulas for clf's with respect to minkowski balls. In *Proc. American Control Conf., San Diego, June 1999*, pages 3033–3037, 1999.

[379] D. Liberzon, E.D. Sontag, and Y. Wang. On integral-input-to-state stabilization. In *Proc. American Control Conf., San Diego, June 1999*, pages 1598–1602, 1999.

[380] W. Maass and E.D. Sontag. A precise characterization of the class of languages recognized by neural nets under gaussian and other common noise distributions. In *Proceedings of the 1998 conference on Advances in neural information processing systems II*, pages 281–287, Cambridge, MA, USA, 1999. MIT Press.

[381] E.D. Sontag. Stability and stabilization: discontinuities and the effect of disturbances. In *Nonlinear analysis, differential equations and control (Montreal, QC, 1998)*, volume 528 of *NATO Sci. Ser. C Math. Phys. Sci.*, pages 551–598. Kluwer Acad. Publ., Dordrecht, 1999.

[382] E.D. Sontag and F.R. Wirth. Remarks on universal nonsingular controls for discrete-time systems. *Systems Control Lett.*, 33(2):81–88, 1998.

[383] E.D. Sontag. Vc dimension of neural networks. In C.M. Bishop, editor, *Neural Networks and Machine Learning*, pages 69–95. Springer, Berlin, 1998.

[384] E.D. Sontag. A learning result for continuous-time recurrent neural networks. *Systems Control Lett.*, 34(3):151–158, 1998.

[385] D. Nešić and E.D. Sontag. Input-to-state stabilization of linear systems with positive outputs. *Systems Control Lett.*, 35(4):245–255, 1998.

[386] E.D. Sontag. Nonlinear feedback stabilization revisited. In *Dynamical systems, control, coding, computer vision (Padova, 1998)*, volume 25 of *Progr. Systems Control Theory*, pages 223–262. Birkhäuser, Basel, 1999. This is a short conference proceedings paper. Please consult the full version "Stability and stabilization: discontinuities and the effect of disturbances".

[387] E.D. Sontag. *Mathematical Control Theory. Deterministic Finite-Dimensional Systems*, volume 6 of *Texts in Applied Mathematics*. Springer-Verlag, New York, second edition, 1998.

[388] P. Koiran and E.D. Sontag. Vapnik-Chervonenkis dimension of recurrent neural networks. *Discrete Appl. Math.*, 86(1):63–79, 1998.

[389] E.D. Sontag. A general approach to path planning for systems without drift. In J. Baillieul, S. S. Sastry, and H.J. Sussmann, editors, *Essays on mathematical robotics (Minneapolis, MN, 1993)*, volume 104 of *IMA Vol. Math. Appl.*, pages 151–168. Springer, New York, 1998.

[390] E.D. Sontag. Comments on integral variants of ISS. *Systems Control Lett.*, 34(1-2):93–100, 1998.

[391] E.D. Sontag. Recent results on discontinuous stabilization and control-Lyapunov functions. In *Proc. Workshop on Control of Nonlinear and Uncertain Systems, London, Feb. 1998*, 1998.

[392] P. Kuusela, D. Ocone, and E.D. Sontag. On the vc dimension of continuous-time linear control systems. In *Proc. 32nd Annual Conf. on Information Sciences and Systems (CISS 98), Princeton, NJ*, pages 795–800, 1998.

[393] E.D. Sontag and Y. Qiao. Remarks on controllability of recurrent neural networks. In *Proc. IEEE Conf. Decision and Control, Tampa, Dec. 1998, IEEE Publications, 1998*, pages 501–506, 1998.

[394] D. Nešić and E.D. Sontag. Output stabilization of nonlinear systems: Linear systems with positive outputs as a case study. In *Proc. IEEE Conf. Decision and Control, Tampa, Dec. 1998, IEEE Publications, 1998*, pages 885–890, 1998.

[395] X. Bao, Z. Lin, and E.D. Sontag. Some new results on finite gain l_p stabilization of discrete-time linear systems subject to actuator saturation. In *Proc. IEEE Conf. Decision and Control, Tampa, Dec. 1998, IEEE Publications, 1998*, pages 4628–4629, 1998.

[396] M. Krichman and E.D. Sontag. A version of a converse Lyapunov theorem for input-output to state stability. In *Proc. IEEE Conf. Decision and Control, Tampa, Dec. 1998, IEEE Publications, 1998*, pages 4121–4126, 1998.

[397] B. Dasgupta and E.D. Sontag. A polynomial-time algorithm for an equivalence problem which arises in hybrid systems theory. In *Proc. IEEE Conf. Decision and Control, Tampa, Dec. 1998, IEEE Publications, 1998*, pages 1629–1634, 1998.

[398] D. Angeli, E.D. Sontag, and Y. Wang. A remark on integral input to state stability. In *Proc. IEEE Conf. Decision and Control, Tampa, Dec. 1998, IEEE Publications, 1998*, pages 2491–2496, 1998.

[399] Y.S. Ledyaev and E.D. Sontag. Stabilization under measurement noise: Lyapunov characterization. In *Proc. American Control Conf., Philadelphia, June 1998*, pages 1658–166, 1998.

[400] E.D. Sontag. Notions of integral input-to-state stability. In *Proc. American Control Conf., Philadelphia, June 1998*, pages 3215–321, 1998.

[401] E.D. Sontag and H.J. Sussmann. Complete controllability of continuous-time recurrent neural networks. *Systems Control Lett.*, 30(4):177–183, 1997.

[402] Y. Yang, E.D. Sontag, and H.J. Sussmann. Global stabilization of linear discrete-time systems with bounded feedback. *Systems Control Lett.*, 30(5):273–281, 1997.

[403] E.D. Sontag. Recurrent neural networks: Some systems-theoretic aspects. In M. Karny, K. Warwick, and V. Kurkova, editors, *Dealing with Complexity: a Neural Network Approach*, pages 1–12. Springer-Verlag, London, 1997.

[404] E.D. Sontag. Shattering all sets of k points in 'general position' requires (k-1)/2 parameters. *Neural Comput.*, 9(2):337–348, 1997.

[405] Y.S. Ledyaev and E.D. Sontag. A notion of discontinuous feedback. In *Control using logic-based switching (Block Island, RI, 1995)*, volume 222 of *Lecture Notes in Control and Inform. Sci.*, pages 97–103. Springer, London, 1997.

[406] P. Koiran and E.D. Sontag. Vapnik-Chervonenkis dimension of recurrent neural networks. In *Computational learning theory (Jerusalem, 1997)*, volume 1208 of *Lecture Notes in Comput. Sci.*, pages 223–237. Springer-Verlag, London, UK, 1997.

[407] P. Koiran and E.D. Sontag. Neural networks with quadratic VC dimension. *J. Comput. System Sci.*, 54(1, part 2):190–198, 1997. (1st Annual Dagstuhl Seminar on Neural Computing, 1994).

[408] E.D. Sontag and Y. Wang. Output-to-state stability and detectability of nonlinear systems. *Systems Control Lett.*, 29(5):279–290, 1997.

[409] E.D. Sontag and Y. Wang. A notion of input to output stability. In *Proc. European Control Conf., Brussels, July 1997*, 1997. (Paper WE-E A2, CD-ROM file ECC958.pdf, 6 pages).

[410] R. Koplon and E.D. Sontag. Using fourier-neural recurrent networks to fit sequential input/output data. *Neurocomputing*, 15:225–248, 1997.

[411] F. Albertini and E.D. Sontag. Control-Lyapunov functions for time-varying set stabilization. In *Proc. European Control Conf., Brussels, July 1997*, 1997. (Paper WE-E A5, CD-ROM file ECC515.pdf, 6 pages).

[412] M. J. Donahue, L. Gurvits, C. Darken, and E.D. Sontag. Rates of convex approximation in non-Hilbert spaces. *Constr. Approx.*, 13(2):187–220, 1997.

[413] F. H. Clarke, Y.S. Ledyaev, E.D. Sontag, and A.I. Subbotin. Asymptotic controllability implies feedback stabilization. *IEEE Trans. Automat. Control*, 42(10):1394–1407, 1997.

[414] Y.S. Ledyaev and E.D. Sontag. A remark on robust stabilization of general asymptotically controllable systems. In *Proc. Conf. on Information Sciences and Systems (CISS 97), Johns Hopkins, Baltimore, MD, March 1997*, pages 246–251, 1997.

[415] E.D. Sontag. Some learning and systems-theoretic questions regarding recurrent neural networks. In *Proc. Conf. on Information Sciences and Systems (CISS 97), Johns Hopkins, Baltimore, MD, March 1997*, pages 630–635, 1997.

[416] E.D. Sontag and Y. Wang. New characterizations of input-to-state stability. *IEEE Trans. Automat. Control*, 41(9):1283–1294, 1996.

[417] W. Liu, Y. Chitour, and E.D. Sontag. On finite-gain stabilizability of linear systems subject to input saturation. *SIAM J. Control Optim.*, 34(4):1190–1219, 1996.

[418] P. Koiran and E.D. Sontag. Neural networks with quadratic vc dimension. In D.S. Touretzky, M.C. Moser, and M.E. Hasselmo, editors, *Advances in Neural Information Processing Systems 8*, pages 197–203. MIT Press, Cambridge, MA, 1996.

[419] E.D. Sontag. Interconnected automata and linear systems: a theoretical framework in discrete-time. In R. Alur, T.A. Henzinger, and E.D. Sontag, editors, *Proceedings of the DIMACS/SYCON workshop on Hybrid systems III : verification and control*, pages 436–448. Springer-Verlag New York, Inc., Secaucus, NJ, USA, 1996.

[420] B. Dasgupta and E.D. Sontag. Sample complexity for learning recurrent perceptron mappings. In D.S. Touretzky, M.C. Moser, and M.E. Hasselmo, editors, *Advances in Neural Information Processing Systems 8*, pages 204–210. MIT Press, Cambridge, MA, 1996.

[421] B. DasGupta and E.D. Sontag. Sample complexity for learning recurrent perceptron mappings. *IEEE Trans. Inform. Theory*, 42(5):1479–1487, 1996.

[422] E.D. Sontag. Critical points for least-squares problems involving certain analytic functions, with applications to sigmoidal nets. *Adv. Comput. Math.*, 5(2-3):245–268, 1996.

[423] Y. Lin, E.D. Sontag, and Y. Wang. A smooth converse Lyapunov theorem for robust stability. *SIAM J. Control Optim.*, 34(1):124–160, 1996.

[424] E.D. Sontag and H.J. Sussmann. General classes of control-Lyapunov functions. In *Stability theory (Ascona, 1995)*, volume 121 of *Internat. Ser. Numer. Math.*, pages 87–96. Birkhäuser, Basel, 1996.

[425] E.D. Sontag and Y. Wang. Detectability of nonlinear systems. In *Proc. Conf. on Information Sciences and Systems (CISS 96), Princeton, NJ*, pages 1031–1036, 1996.

[426] F.H. Clarke, Y.S. Ledyaev, E.D. Sontag, and A.I. Subbotin. Asymptotic controllability and feedback stabilization. In *Proc. Conf. on Information Sciences and Systems (CISS 96)Princeton, NJ*, pages 1232–1237, 1996.

[427] E.D. Sontag and F.R. Wirth. Remarks on universal nonsingular controls for discrete-time systems. Technical Report 381, Institute for Dynamical Systems, University of Bremen, 1996.

[428] R. Alur, T.A. Henzinger, and E.D. Sontag. *Hybrid Systems III. Verification and Control (edited book)*. Springer Verlag, Berlin, 1996. (LNCS 1066).

[429] E.D. Sontag. State-space and i/o stability for nonlinear systems. In *Feedback control, nonlinear systems, and complexity (Montreal, PQ, 1994)*, volume 202 of *Lecture Notes in Control and Inform. Sci.*, pages 215–235. Springer, London, 1995. (Expository paper, placed online per request. The paper "Input to state stability: Basic concepts and results" is far more up to date and should be downloaded instead of this one!).

[430] Y. Wang and E.D. Sontag. Orders of input/output differential equations and state-space dimensions. *SIAM J. Control Optim.*, 33(4):1102–1126, 1995.

[431] Y. Lin and E.D. Sontag. Control-Lyapunov universal formulas for restricted inputs. *Control Theory Adv. Tech.*, 10(4, part 5):1981–2004, 1995.

[432] E.D. Sontag. Control of systems without drift via generic loops. *IEEE Trans. Automat. Control*, 40(7):1210–1219, 1995.

[433] Y. Lin, E.D. Sontag, and Y. Wang. Input to state stabilizability for parametrized families of systems. *Internat. J. Robust Nonlinear Control*, 5(3):187–205, 1995.

[434] Y. Chitour, W. Liu, and E.D. Sontag. On the continuity and incremental-gain properties of certain saturated linear feedback loops. *Internat. J. Robust Nonlinear Control*, 5(5):413–440, 1995.

[435] H. T. Siegelmann and E.D. Sontag. On the computational power of neural nets. *J. Comput. System Sci.*, 50(1):132–150, 1995.

[436] E.D. Sontag and Y. Wang. On characterizations of the input-to-state stability property. *Systems Control Lett.*, 24(5):351–359, 1995.

[437] E.D. Sontag. On the input-to-state stability property. *European J. Control*, 1:24–36, 1995.

[438] E.D. Sontag. Spaces of observables in nonlinear control. In *Proceedings of the International Congress of Mathematicians, Vol. 1, 2 (Zürich, 1994)*, pages 1532–1545, Basel, 1995. Birkhäuser.

[439] E.D. Sontag and A.R. Teel. Changing supply functions in input/state stable systems. *IEEE Trans. Automat. Control*, 40(8):1476–1478, 1995.

[440] B. DasGupta, H.T. Siegelmann, and E.D. Sontag. On the complexity of training neural networks with continuous activation functions. *IEEE Trans. Neural Networks*, 6:1490–1504, 1995.

[441] M. A. Dahleh, E.D. Sontag, D. N. C. Tse, and J. N. Tsitsiklis. Worst-case identification of nonlinear fading memory systems. *Automatica*, 31(3):503–508, 1995.

[442] A.R. Teel, T.T. Georgiou, L. Praly, and E.D. Sontag. Input-output stability. In W. S. Levine, editor, *The Control Handbook*, pages 895–908. CRC Press, Boca Raton, 1995.

[443] E.D. Sontag. Automata and neural networks. In *The handbook of brain theory and neural networks*, pages 119–122. MIT Press, Cambridge, MA, USA, 1998.

[444] E.D. Sontag and Y. Wang. On characterizations of input-to-state stability with respect to compact sets. In *Proceedings of IFAC Non-Linear Control Systems Design Symposium, (NOLCOS '95), Tahoe City, CA, June 1995*, pages 226–231, 1995.

[445] E.D. Sontag. Critical points for neural net least-squares problems. In *Proc. 1995 IEEE Internat. Conf. Neural Networks, IEEE Publications, 1995*, pages 2949–2954, 1995.

[446] E.D. Sontag and Y. Wang. Various results concerning set input-to-state stability. In *Proc. IEEE Conf. Decision and Control, New Orleans, Dec. 1995, IEEE Publications, 1995*, pages 1330–1335, 1995.

[447] E.D. Sontag and H.J. Sussmann. Nonsmooth control-Lyapunov functions. In *Proc. IEEE Conf. Decision and Control, New Orleans, Dec. 1995, IEEE Publications, 1995*, pages 2799–2805, 1995.

[448] E.D. Sontag. An abstract approach to dissipation. In *Proc. IEEE Conf. Decision and Control, New Orleans, Dec. 1995, IEEE Publications, 1995*, pages 2702–2703, 1995. Full version, never submitted, is here: http://sontaglab.org/FTPDIR/dissipation.pdf.

[449] E.D. Sontag. From linear to nonlinear: some complexity comparisons. In *Proc. IEEE Conf. Decision and Control, New Orleans, Dec. 1995, IEEE Publications, 1995*, pages 2916–2920, 1995.

[450] H.J. Sussmann, E.D. Sontag, and Y. Yang. A general result on the stabilization of linear systems using bounded controls. *IEEE Trans. Automat. Control*, 39(12):2411–2425, 1994.

[451] R. Koplon, E.D. Sontag, and M. L. J. Hautus. Observability of linear systems with saturated outputs. *Linear Algebra Appl.*, 205/206:909–936, 1994.

[452] F. Albertini and E.D. Sontag. State observability in recurrent neural networks. *Systems Control Lett.*, 22(4):235–244, 1994.

[453] W. Maass, G. Schnitger, and E.D. Sontag. A comparison of the computational power of sigmoid and Boolean threshold circuits. In V.P̃. Roychowdhury, Siu K. Y., and Orlitsky A., editors, *Theoretical Advances in Neural Computation and Learning*, pages 127–151. Kluwer Academic Publishers, 1994.

[454] B. DasGupta, H. T. Siegelmann, and E.D. Sontag. On a learnability question associated to neural networks with continuous activations (extended abstract). In *COLT '94: Proceedings of the seventh annual conference on Computational learning theory*, pages 47–56, New York, NY, USA, 1994. ACM Press.

[455] B. DasGupta, H.T. Siegelmann, and E.D. Sontag. On the intractability of loading neural networks. In V.P̃. Roychowdhury, Siu K. Y., and Orlitsky A., editors, *Theoretical Advances in Neural Computation and Learning*, pages 357–389. Kluwer Academic Publishers, 1994.

[456] F. Albertini and E.D. Sontag. Further results on controllability properties of discrete-time nonlinear systems. *Dynam. Control*, 4(3):235–253, 1994.

[457] E.D. Sontag and Y. Wang. Orders of i/o equations and uniformly universal inputs. In *Proc. IEEE Conf. Decision and Control, Orlando, Dec. 1994, IEEE Publications, 1994*, pages 1270–1275, 1994.

[458] Y. Chitour, W. Liu, and E.D. Sontag. On the continuity and incremental gain properties of certain saturated linear feedback loops. In *Proc. IEEE Conf. Decision and Control, Orlando, Dec. 1994, IEEE Publications, 1994*, pages 127–132, 1994.

[459] R. Koplon and E.D. Sontag. Techniques for parameter reconstruction in fourier-neural recurrent networks. In *Proc. IEEE Conf. Decision and Control, Orlando, Dec. 1994, IEEE Publications, 1994*, pages 213–218, 1994.

[460] E.D. Sontag and Y. Wang. Notions equivalent to input-to-state stability. In *Proc. IEEE Conf. Decision and Control, Orlando, Dec. 1994, IEEE Publications, 1994*, pages 3438–3443, 1994.

[461] Y. Lin and E.D. Sontag. On control-Lyapunov functions under input constraints. In *Proc. IEEE Conf. Decision and Control, Orlando, Dec. 1994, IEEE Publications, 1994*, pages 640–645, 1994.

[462] Y. Lin, E.D. Sontag, and Y. Wang. Recent results on Lyapunov-theoretic techniques for nonlinear stability. In *Proc. Amer. Automatic Control Conf., Baltimore, June 1994*, pages 1771–1775, 1994.

[463] H. T. Siegelmann and E.D. Sontag. Analog computation via neural networks. *Theoret. Comput. Sci.*, 131(2):331–360, 1994.

[464] E.D. Sontag. Universal nonsingular controls. *Systems Control Lett.*, 19(3):221–224, 1992. Erratum appeared in SCL 20(1993), p. 77, can be found in same file.

[465] E.D. Sontag and H.J. Sussmann. Time-optimal control of manipulators (reprint of 1986 ieee int conf on robotics and automation paper. In M.W. Spong, F.L. Lewis, and C.T. Abdallah, editors, *Robot Control*, pages 266–271. IEEE Press, New York, 1993.

[466] R. Koplon and E.D. Sontag. Linear systems with sign-observations. *SIAM J. Control Optim.*, 31(5):1245–1266, 1993.

[467] F. Albertini and E.D. Sontag. Uniqueness of weights for recurrent nets. In *Systems and Networks: Mathematical Theory and Applications, Proc. MTNS '93, Vol. 2, Akad. Verlag, Regensburg*, pages 599–602, 1993. Full version, never submitted for publication, is here: http://sontaglab.org/FTPDIR/93mtns-nn-extended.pdf.

[468] F. Albertini and E.D. Sontag. Controllability of discrete-time nonlinear systems. In *Systems and Networks: Mathematical Theory and Applications, Proc. MTNS '93, Vol. 2, Akad. Verlag, Regensburg*, pages 35–38, 1993.

[469] F. Albertini and E.D. Sontag. Identifiability of discrete-time neural networks. In *Proc. European Control Conf., Groningen, June 1993*, pages 460–465, 1993.

[470] Y. Yang and E.D. Sontag. Stabilization with saturated actuators, a worked example: F-8 longitudinal flight control. In *Proc. 1993 IEEE Conf. on Aerospace Control Systems, Thousand Oaks, CA, May 1993*, pages 289–293, 1993.

[471] F. Albertini and E.D. Sontag. Discrete-time transitivity and accessibility: analytic systems. *SIAM J. Control Optim.*, 31(6):1599–1622, 1993.

[472] F. Albertini and E.D. Sontag. For neural networks, function determines form. *Neural Networks*, 6(7):975–990, 1993.

[473] A. Macintyre and E.D. Sontag. Finiteness results for sigmoidal "neural" networks. In *STOC '93: Proceedings of the twenty-fifth annual ACM symposium on Theory of computing*, pages 325–334, New York, NY, USA, 1993. ACM Press.

[474] J. L. Balcázar, R. Gavaldà, H. T. Siegelmann, and E.D. Sontag. Some structural complexity aspects of neural computation. In *Proceedings of the Eighth Annual Structure in Complexity Theory Conference (San Diego, CA, 1993)*, pages 253–265, Los Alamitos, CA, 1993. IEEE Comput. Soc. Press.

[475] H.T. Siegelmann and E.D. Sontag. Analog computation via neural networks. In *Proc. 2nd Israel Symposium on Theory of Computing and Systems (ISTCS93), IEEE Computer Society Press, 1993*, 1993.

[476] E.D. Sontag. Neural networks for control. In H. L. Trentelman and J. C. Willems, editors, *Essays on control: perspectives in the theory and its applications (Groningen, 1993)*, volume 14 of *Progr. Systems Control Theory*, pages 339–380. Birkhäuser Boston, Boston, MA, 1993. A longer version (tech report with more details) is here: http://sontaglab.org/FTPDIR/neural-nets-siemens.pdf.

[477] C. Darken, M.J. Donahue, L. Gurvits, and E.D. Sontag. Rate of approximation results motivated by robust neural network learning. In *COLT '93: Proceedings of the sixth annual conference on Computational learning theory*, pages 303–309, New York, NY, USA, 1993. ACM Press.

[478] Y. Lin, E.D. Sontag, and Y. Wang. Lyapunov-function characterizations of stability and stabilization for parameterized families of systems. In *Proc. IEEE Conf. Decision and Control, San Antonio, Dec. 1993, IEEE Publications, 1993*, pages 1978–1983, 1993.

[479] H.J. Sussmann, E.D. Sontag, and Y. Yang. A general result on the stabilization of linear systems using bounded controls. In *Proc. IEEE Conf. Decision and Control, San Antonio, Dec. 1993, IEEE Publications, 1993*, pages 1802–1807, 1993.

[480] R. Koplon and E.D. Sontag. Sign-linear systems as cascades of automata and continuous variable systems. In *Proc. IEEE Conf. Decision and Control, San Antonio, Dec. 1993, IEEE Publications, 1993*, pages 2290–2291, 1993.

[481] E.D. Sontag. Gradient techniques for systems with no drift: A classical idea revisited. In *Proc. IEEE Conf. Decision and Control, San Antonio, Dec. 1993, IEEE Publications, 1993*, pages 2706–2711, 1993.

[482] F. Albertini and E.D. Sontag. State observability in recurrent neural networks. In *Proc. IEEE Conf. Decision and Control, San Antonio, Dec. 1993, IEEE Publications, 1993*, pages 3706–3707, 1993.

[483] W. Liu, Y. Chitour, and E.D. Sontag. Remarks on finite gain stabilizability of linear systems subject to input saturation. In *Proc. IEEE Conf. Decision and Control, San Antonio, Dec. 1993, IEEE Publications, 1993*, pages 1808–1813, 1993.

[484] G.A. Lafferriere and E.D. Sontag. Remarks on control Lyapunov functions for discontinuous stabilizing feedback. In *Proc. IEEE Conf. Decision and Control, San Antonio, Dec. 1993, IEEE Publications, 1993*, pages 306–308, 1993.

[485] F. Albertini, E.D. Sontag, and V. Maillot. Uniqueness of weights for neural networks. In R. Mammone, editor, *Artificial Neural Networks for Speech and Vision*, pages 115–125. Chapman and Hall, London, 1993.

[486] Y. Wang and E.D. Sontag. Generating series and nonlinear systems: analytic aspects, local realizability, and i/o representations. *Forum Math.*, 4(3):299–322, 1992.

[487] Y. Wang and E.D. Sontag. Algebraic differential equations and rational control systems. *SIAM J. Control Optim.*, 30(5):1126–1149, 1992.

[488] E.D. Sontag. Feedback stabilization using two-hidden-layer nets. *IEEE Trans. Neural Networks*, 3:981–990, 1992.

[489] E.D. Sontag. Feedforward nets for interpolation and classification. *J. Comput. System Sci.*, 45(1):20–48, 1992.

[490] M.A. Dahleh, E.D. Sontag, D.N.C. Tse, and J.N. Tsitsiklis. Worst-case identification of nonlinear fading memory systems. In *Proc. Amer. Automatic Control Conf., Chicago, June 1992*, pages 241–245, 1992.

[491] E.D. Sontag. Neural nets as systems models and controllers. In *Proc. Seventh Yale Workshop on Adaptive and Learning Systems, Yale University, 1992*, pages 73–79, 1992.

[492] E.D. Sontag and Y. Lin. Stabilization with respect to noncompact sets: Lyapunov characterizations and effect of bounded inputs. In *Nonlinear Control Systems Design 1992, IFAC Symposia Series, M. Fliess Ed., Pergamon Press, Oxford, 1993*, pages 43–49, 1992. Also in *Proc. Nonlinear Control Systems Design Symp., Bordeaux, June 1992,(M. Fliess, Ed.), IFAC Publications, pp. 9–14*.

[493] Y. Yang, H.J. Sussmann, and E.D. Sontag. Stabilization of linear systems with bounded controls. In *Nonlinear Control Systems Design 1992, IFAC Symposia Series, 1993, M. Fliess Ed., Pergamon Press, Oxford, 1993*, pages 51–56, 1992. Also in *Proc. Nonlinear Control Systems Design Symp., Bordeaux, June 1992*,(M. Fliess, Ed.), IFAC Publications, pp. 15-20.

[494] E.D. Sontag. Systems combining linearity and saturations, and relations to neural nets. In *Nonlinear Control Systems Design 1992, IFAC Symposia Series, 1993, M. Fliess Ed., Pergamon Press, Oxford, 1993*, pages 15–21, 1992. (Also in Proc. Nonlinear Control Systems Design Symp., Bordeaux, June 1992, M. Fliess, Ed., IFAC Publications, pp. 242-247).

[495] H.T. Siegelmann, E.D. Sontag, and C.L. Giles. The complexity of language recognition by neural networks. In *Proceedings of the IFIP 12th World Computer Congress on Algorithms, Software, Architecture - Information Processing '92, Volume 1*, pages 329–335. North-Holland, 1992.

[496] H.T. Siegelmann and E.D. Sontag. On the computational power of neural nets. In *COLT '92: Proceedings of the fifth annual workshop on Computational learning theory*, pages 440–449, New York, NY, USA, 1992. ACM Press.

[497] Y. Lin and E.D. Sontag. Gradient techniques for steering systems with no drift. In *Proc. Conf. Inform. Sci. and Systems, Princeton University, March 1992*, pages 1003–1008, 1992.

[498] E.D. Sontag and Y. Wang. I/o equations in discrete and continuous time. In *Proc. IEEE Conf. Decision and Control, Tucson, Dec. 1992, IEEE Publications, 1992*, pages 3661–3662, 1992.

[499] H.T. Siegelmann and E.D. Sontag. Some results on computing with neural nets. In *Proc. IEEE Conf. Decision and Control, Tucson, Dec. 1992, IEEE Publications, 1992*, pages 1476–1481, 1992.

[500] F. Albertini and E.D. Sontag. For neural networks, function determines form. In *Proc. IEEE Conf. Decision and Control, Tucson, Dec. 1992, IEEE Publications, 1992*, pages 26–31, 1992.

[501] R. Schwarzschild, E.D. Sontag, and M.L.J. Hautus. Output-saturated systems. In *Proc. Amer. Automatic Control Conf. , Chicago, June 1992*, pages 2504–2509, 1992.

[502] Y. Lin and E.D. Sontag. A universal formula for stabilization with bounded controls. *Systems Control Lett.*, 16(6):393–397, 1991.

[503] E.D. Sontag. Kalman's controllability rank condition: from linear to nonlinear. In *Mathematical system theory*, pages 453–462. Springer, Berlin, 1991.

[504] E.D. Sontag and H.J. Sussmann. Back propagation separates where perceptrons do. *Neural Networks*, 4(2):243–249, 1991.

[505] W. Maass, G. Schnitger, and E.D. Sontag. On the computational power of sigmoid versus Boolean threshold circuits (extended abstract). In *Proceedings of the 32nd annual symposium on Foundations of computer science*, pages 767–776, Los Alamitos, CA, USA, 1991. IEEE Computer Society Press.

[506] E.D. Sontag. Capabilities and training of feedforward nets. In *Neural networks (New Brunswick, NJ, 1990)*, pages 303–321. Academic Press, Boston, MA, 1991.

[507] H. T. Siegelmann and E.D. Sontag. Turing computability with neural nets. *Appl. Math. Lett.*, 4(6):77–80, 1991.

[508] E.D. Sontag. *Mathematical Control Theory. Deterministic Finite-Dimensional Systems*, volume 6 of *Texts in Applied Mathematics*. Springer-Verlag, New York, 1990.

[509] E.D. Sontag. Remarks on interpolation and recognition using neural nets. In *NIPS-3: Proceedings of the 1990 conference on Advances in neural information processing systems 3*, pages 939–945, San Francisco, CA, USA, 1990. Morgan Kaufmann Publishers Inc.

[510] F. Albertini and E.D. Sontag. Some connections between chaotic dynamical systems and control systems. In *Proc. European Control Conf. , Vol 1, Grenoble, July 1991*, pages 58–163, 1991.

[511] Y. Lin and E.D. Sontag. Further universal formulas for Lyapunov approaches to nonlinear stabilization. In *Proc. Conf. Inform. Sci. and Systems, John Hopkins University, March 1991*, pages 541–546, 1991.

[512] E.D. Sontag. Capabilities of four- vs three-layer nets, and control applications. In *Proc. Conf. Inform. Sci. and Systems, John Hopkins University, March 1991*, pages 558–563, 1991.

[513] R. Schwarzschild and E.D. Sontag. Quantized systems, saturated measurements, and sign-linear systems. In *Proc. Conf. Inform. Sci. and Systems, John Hopkins University, March 1991*, pages 134–139, 1991.

[514] F. Albertini and E.D. Sontag. Accessibility of discrete-time nonlinear systems, and some relations to chaotic dynamics. In *Proc. Conf. Inform. Sci. and Systems, John Hopkins University, March 1991*, pages 731–736, 1991.

[515] E.D. Sontag and Y. Wang. I/o equations for nonlinear systems and observation spaces. In *Proc. IEEE Conf. Decision and Control, Brighton, UK, Dec. 1991, IEEE Publications, 1991*, pages 720–725, 1991.

[516] E.D. Sontag. Feedback stabilization using two-hidden-layer nets. In *Proc. Amer. Automatic Control Conf. , Boston, June 1991*, pages 815–820, 1991.

[517] R. Schwarzschild and E.D. Sontag. Algebraic theory of sign-linear systems. In *Proc. Amer. Automatic Control Conf., Boston, June 1991*, pages 799–804, 1991.

[518] F. Albertini and E.D. Sontag. Transitivity and forward accessibility of discrete-time nonlinear systems. In *Analysis of controlled dynamical systems (Lyon, 1990)*, volume 8 of *Progr. Systems Control Theory*, pages 21–34. Birkhäuser Boston, Boston, MA, 1991.

[519] E.D. Sontag. Input/output and state-space stability. In *New trends in systems theory (Genoa, 1990)*, volume 7 of *Progr. Systems Control Theory*, pages 684–691. Birkhäuser Boston, Boston, MA, 1991.

[520] E.D. Sontag and Y. Wang. Pole shifting for families of linear systems depending on at most three parameters. *Linear Algebra Appl.*, 137/138:3–38, 1990.

[521] T. Asano, J. Hershberger, J. Pach, E.D. Sontag, D. Souivaine, and S. Suri. Separating bi-chromatic points by parallel lines. In *Proceedings of the Second Canadian Conf. on Computational Geometry, Ottawa, Canada, 1990*, pages 46–49, 1990.

[522] E.D. Sontag. Constant McMillan degree and the continuous stabilization of families of transfer matrices. In *Control of uncertain systems (Bremen, 1989)*, volume 6 of *Progr. Systems Control Theory*, pages 289–295. Birkhäuser Boston, Boston, MA, 1990.

[523] E.D. Sontag. Further facts about input to state stabilization. *IEEE Trans. Automat. Control*, 35(4):473–476, 1990.

[524] H. Dewan and E.D. Sontag. Extrapolatory methods for speeding up the bp algorithm. In *Proc. Int. Joint Conf. on Neural Networks, Washington, DC, Jan. 1990, Lawrence Erlbaum Associates, Inc., Publishers, ISBN 0-8058-0775-6*, pages I.613–616, 1990.

[525] B. Jakubczyk and E.D. Sontag. Controllability of nonlinear discrete-time systems: a Lie-algebraic approach. *SIAM J. Control Optim.*, 28(1):1–33, 1990.

[526] E.D. Sontag. Integrability of certain distributions associated with actions on manifolds and applications to control problems. In *Nonlinear controllability and optimal control*, volume 133 of *Monogr. Textbooks Pure Appl. Math.*, pages 81–131. Dekker, New York, 1990.

[527] Y. Wang and E.D. Sontag. Realization of families of generating series: differential algebraic and state space equations. In *Proc. 11th IFAC World Congress, Tallinn, former USSR, 1990*, pages 62–66, 1990.

[528] E.D. Sontag. Comparing sigmoids and heavisides. In *Proc. Conf. Info. Sci. and Systems, Princeton, 1990*, pages 654–659, 1990.

[529] E.D. Sontag and H.J. Sussmann. Nonlinear output feedback design for linear systems with saturating controls. In *Proc. IEEE Conf. Decision and Control, Honolulu, Dec. 1990, IEEE Publications, 1990*, pages 3414–3416, 1990.

[530] E.D. Sontag and Y. Wang. Input/output equations and realizability. In *Realization and modelling in system theory (Amsterdam, 1989)*, volume 3 of *Progr. Systems Control Theory*, pages 125–132. Birkhäuser Boston, Boston, MA, 1990.

[531] E.D. Sontag. Feedback stabilization of nonlinear systems. In *Robust control of linear systems and nonlinear control (Amsterdam, 1989)*, volume 4 of *Progr. Systems Control Theory*, pages 61–81. Birkhäuser Boston, Boston, MA, 1990.

[532] F. Albertini and E.D. Sontag. Some connections between chaotic dynamical systems and control systems. Technical Report SYCON-90-13, Rutgers Center for Systems and Control, 1990.

[533] E.D. Sontag and Y. Yamamoto. On the existence of approximately coprime factorizations for retarded systems. *Systems Control Lett.*, 13(1):53–58, 1989.

[534] Y. Wang and E.D. Sontag. On two definitions of observation spaces. *Systems Control Lett.*, 13(4):279–289, 1989.

[535] Y. Wang and E.D. Sontag. A new result on the relation between differential-algebraic realizability and state space realizations. In *Proc. Conf. Info. Sciences and Systems, Johns Hopkins University Press, 1989*, pages 143–147, 1989.

[536] E.D. Sontag. Sigmoids distinguish more efficiently than heavisides. Technical Report SYCON-89-12, Rutgers Center for Systems and Control, 1989.

[537] E.D. Sontag and H.J. Sussmann. Backpropagation separates when perceptrons do. In *Proc. IEEE Int. Conf. Neural Networks, Washington, DC, June 1989*, pages 639–642, 1989.

[538] E.D. Sontag. Sigmoids distinguish more efficiently than heavisides. *Neural Computation*, 1:470–472, 1989.

[539] E.D. Sontag and H.J. Sussmann. Further comments on the stabilizability of the angular velocity of a rigid body. *Systems Control Lett.*, 12(3):213–217, 1989.

[540] B. Jakubczyk and E.D. Sontag. Nonlinear discrete-time systems. Accessibility conditions. In *Modern optimal control*, volume 119 of *Lecture Notes in Pure and Appl. Math.*, pages 173–185. Dekker, New York, 1989.

[541] E.D. Sontag and H.J. Sussmann. Remarks on local minima in backpropagation. In *Proc. Conf. Info. Sciences and Systems, Johns Hopkins University Press, 1989*, pages 432–435, 1989.

[542] E.D. Sontag. Some recent results on nonlinear feedback. In *Proc. Conf. Info. Sciences and Systems, Johns Hopkins University Press, 1989*, pages 151–156, 1989.

[543] E.D. Sontag. Smooth stabilization implies coprime factorization. *IEEE Trans. Automat. Control*, 34(4):435–443, 1989.

[544] E.D. Sontag and H.J. Sussmann. Backpropagation can give rise to spurious local minima even for networks without hidden layers. *Complex Systems*, 3(1):91–106, 1989.

[545] E.D. Sontag. A "universal" construction of Artstein's theorem on nonlinear stabilization. *Systems Control Lett.*, 13(2):117–123, 1989.

[546] A. Arapostathis, B. Jakubczyk, H.-G. Lee, S. I. Marcus, and E.D. Sontag. The effect of sampling on linear equivalence and feedback linearization. *Systems Control Lett.*, 13(5):373–381, 1989.

[547] Y. Wang and E.D. Sontag. Realization and input/output relations: the analytic case. In *Proceedings of the 28th IEEE Conference on Decision and Control, Vol. 1–3 (Tampa, FL, 1989)*, pages 1975–1980, New York, 1989. IEEE.

[548] E.D. Sontag. Remarks on stabilization and input-to-state stability. In *Proceedings of the 28th IEEE Conference on Decision and Control, Vol. 1–3 (Tampa, FL, 1989)*, pages 1376–1378, New York, 1989. IEEE.

[549] E.D. Sontag. Remarks on the time-optimal control of a class of Hamiltonian systems. In *Proceedings of the 28th IEEE Conference on Decision and Control, Vol. 1–3 (Tampa, FL, 1989)*, pages 217–221, New York, 1989. IEEE.

[550] E.D. Sontag. Some connections between stabilization and factorization. In *Proceedings of the 28th IEEE Conference on Decision and Control, Vol. 1–3 (Tampa, FL, 1989)*, pages 990–995, New York, 1989. IEEE.

[551] E.D. Sontag. Integrability of certain distributions associated to actions on manifolds and an introduction to lie-algebraic control. Technical Report SYCON-88-04, Rutgers Center for Systems and Control, 1988.

[552] E.D. Sontag. Some remarks on the backpropagation algorithm for neural net learning. Technical Report SYCON-88-02, Rutgers Center for Systems and Control, 1988.

[553] B.N. Datta, C.R. Johnson, M.A. Kaashoek, R.J. Plemmons, and E.D. Sontag. *Linear Algebra in Signals, Systems, and Control (edited book)*. SIAM, 1988.

[554] E.D. Sontag. Bilinear realizability is equivalent to existence of a singular affine differential I/O equation. *Systems Control Lett.*, 11(3):181–187, 1988.

[555] E.D. Sontag. Finite-dimensional open-loop control generators for nonlinear systems. *Internat. J. Control*, 47(2):537–556, 1988.

[556] E.D. Sontag. An explicit construction of the equilinearization controller. In C.I. Byrnes, C.F. Martin, and R. Saek, editors, *Analysis and Control of Nonlinear Systems*, pages 483–492. North Holland, Amsterdam, 1988.

[557] E.D. Sontag. Controllability is harder to decide than accessibility. *SIAM J. Control Optim.*, 26(5):1106–1118, 1988.

[558] E.D. Sontag. A chow property for sampled bilinear systems. In C.I. Byrnes, C.F. Martin, and R. Saeks, editors, *Analysis and Control of Nonlinear Systems*, pages 205–211. North Holland, Amsterdam, 1988.

[559] E.D. Sontag. Some complexity questions regarding controllability. In *Proc. IEEE Conf. Decision and Control, Austin, Dec. 1988*, pages 1326–1329, 1988.

[560] E.D. Sontag. Stabilizability, i/o stability, and coprime factorizations. In *Proc. IEEE Conf. Decision and Control, Austin, Dec. 1988*, pages 457–458, 1988.

[561] E.D. Sontag. Controllability and linearized regulation. *IEEE Trans. Automat. Control*, 32(10):877–888, 1987.

[562] E.D. Sontag. Equilinearization: A simplified derivation and experimental results. In *Proc. Conf. Info. Sciences and Systems, Johns Hopkins University Press*, pages 490–495, 1987.

[563] E.D. Sontag. A remark on bilinear systems and moduli spaces of instantons. *Systems Control Lett.*, 9(5):361–367, 1987.

[564] B. Jakubczyk and E.D. Sontag. The effect of sampling on feedback linearization. In *Proc. IEEE Conf. Decision and Control, Los Angeles, Dec.1987*, pages 1374–1379, 1987.

[565] E.D. Sontag. An approach to the automatic design of first-order controllers along reference trajectories. In *Proc. IEEE Conf. Decision and Control, Los Angeles, Dec.1987*, pages 363–1367, 1987.

[566] E.D. Sontag. Reachability, observability, and realization of a class of discrete-time nonlinear systems. In *Encycl. of Systems and Control*, pages 3288–3293. Pergamon Press, 1987.

[567] E.D. Sontag and H.J. Sussmann. Optimization algorithms for image restoration and segmentation. Technical Report 34, Rutgers Center for Computer Aids for Industrial Productivity, 1987.

[568] E.D. Sontag. Review of Multidimensional Systems Theory. *Linear Alg. and Applications*, 87:273–278, 1987.

[569] E.D. Sontag. Comments on: "Some results on pole-placement and reachability" [Systems Control Lett. **6** (1986), no. 5, 325–328; MR0821927 (87c:93032)] by P. K. Sharma. *Systems Control Lett.*, 8(1):79–83, 1986.

[570] E.D. Sontag and H.J. Sussmann. Time-optimal control of manipulators. In *Proc. IEEE Int.Conf.on Robotics and Automation, San Francisco, April 1986*, pages 1692–1697, 1986.

[571] E.D. Sontag. Controllability and linearized regulation. In *Proc. Conf. Info. Sci. and Systems, Princeton, 1986*, pages 67–671, 1986.

[572] E.D. Sontag. Orbit theorems and sampling. In *Algebraic and geometric methods in nonlinear control theory*, volume 29 of *Math. Appl.*, pages 441–483. Reidel, Dordrecht, 1986.

[573] M. L. J. Hautus and E.D. Sontag. New results on pole-shifting for parametrized families of systems. *J. Pure Appl. Algebra*, 40(3):229–244, 1986.

[574] E.D. Sontag. Continuous stabilizers and high-gain feedback. *IMA Journal of Mathematical Control and Information*, 3:237–253, 1986.

[575] E.D. Sontag. An eigenvalue condition for sample weak controllability of bilinear systems. *Systems Control Lett.*, 7(4):313–315, 1986.

[576] E.D. Sontag and H.J. Sussmann. Remarks on the time-optimal control of two-link manipulators. In *Proc. IEEE Conf. Dec. and Control, 1985*, pages 1646–1652, 1985.

[577] E.D. Sontag. Real addition and the polynomial hierarchy. *Inform. Process. Lett.*, 20(3):115–120, 1985.

[578] E.D. Sontag. Further results on accessibility under sampling. In *Proc.Conf. Info. Sci. and Systems, Johns Hopkins University, March 1985*, 1985.

[579] E.D. Sontag and H.J. Sussmann. Image restoration and segmentation using the annealing algorithm. In *Proc. IEEE Conf. Dec. and Control, 1985*, pages 768–773, 1985.

[580] B.W. Dickinson and E.D. Sontag. Dynamic realizations of sufficient sequences. *IEEE Trans. Inform. Theory*, 31(5):670–676, 1985.

[581] E.D. Sontag. An introduction to the stabilization problem for parametrized families of linear systems. In *Linear algebra and its role in systems theory (Brunswick, Maine, 1984)*, volume 47 of *Contemp. Math.*, pages 369–400. Amer. Math. Soc., Providence, RI, 1985.

[582] E.D. Sontag. A concept of local observability. *Systems Control Lett.*, 5(1):41–47, 1984.

[583] E.D. Sontag. An algebraic approach to bounded controllability of linear systems. *Internat. J. Control*, 39(1):181–188, 1984.

[584] E.D. Sontag. Parametric stabilization is easy. *Systems Control Lett.*, 4(4):181–188, 1984.

[585] E.D. Sontag. An approximation theorem in nonlinear sampling. In *Mathematical theory of networks and systems (Beer Sheva, 1983)*, volume 58 of *Lecture Notes in Control and Inform. Sci.*, pages 806–812. Springer, London, 1984.

[586] C.A. Schwartz, B.W. Dickinson, and E.D. Sontag. Characterizing innovations realizations for random processes. *Stochastics*, 11(3-4):159–172, 1984.

[587] E.D. Sontag. Remarks on input/output linearization. In *Proc. IEEE Conf. Dec. and Control, Las Vegas, Dec. 1984*, pages 409–412, 1984.

[588] E.D. Sontag. A Lyapunov-like characterization of asymptotic controllability. *SIAM J. Control Optim.*, 21(3):462–471, 1983.

[589] E.D. Sontag. Further remarks preservation of accessibility under sampling. In *Proc. Johns Hopkins Conf. on Info. Sci. and Systems, 1983*, pages 326–332, 1983.

[590] R.T. Bumby and E.D. Sontag. Stabilization of polynomially parametrized families of linear systems. The single-input case. *Systems Control Lett.*, 3(5):251–254, 1983.

[591] E.D. Sontag. Remarks on the preservation of various controllability properties under sampling. In *Mathematical tools and models for control, systems analysis and signal processing, Vol. 3 (Toulouse/Paris, 1981/1982)*, Travaux Rech. Coop. Programme 567, pages 623–637. CNRS, Paris, 1983.

[592] E.D. Sontag. Small-input controllability. In *Proc. IEEE Conf. Dec. and Control, Orlando, Dec. 1982*, 1982.

[593] E.D. Sontag. Abstract regulation of nonlinear systems: stabilization. In *Feedback control of linear and nonlinear systems (Bielefeld/Rome, 1981)*, volume 39 of *Lecture Notes in Control and Inform. Sci.*, pages 227–243. Springer, Berlin, 1982.

[594] E.D. Sontag. Remarks on piecewise-linear algebra. *Pacific J. Math.*, 98(1):183–201, 1982.

[595] P.P. Khargonekar and E.D. Sontag. On the relation between stable matrix fraction factorizations and regulable realizations of linear systems over rings. *IEEE Trans. Automat. Control*, 27(3):627–638, 1982.

[596] E.D. Sontag. Abstract regulation of nonlinear systems: Stabilization, part ii. In *Proc.Princeton Conf.on Information Sciences and Systems, Princeton, March 1982*, pages 431–435, 1982.

[597] E.D. Sontag. A characterization of asymptotic controllability. In A. Bednarek and L. Cesari, editors, *Dynamical Systems II*, pages 645–648. Academic Press, NY, 1982.

[598] E.D. Sontag and H.J. Sussmann. Accessibility under sampling. In *Proc. IEEE Conf. Dec. and Control, Orlando, Dec. 1982*, 1982.

[599] E.D. Sontag. Conditions for abstract nonlinear regulation. *Inform. and Control*, 51(2):105–127, 1981.

[600] E.D. Sontag. Nonlinear regulation: the piecewise linear approach. *IEEE Trans. Automat. Control*, 26(2):346–358, 1981.

[601] P.P. Khargonekar and E.D. Sontag. On the relation between stable matrix fraction decompositions and regulable realizations of systems over rings. In *Proc. IEEE Conf.Dec. and Control, San Diego, Dec. 1981*, pages 1006–1011, 1981.

[602] E.D. Sontag. Linear systems over commutative rings: a (partial) updated survey. In *8th IFAC Triennial World Congress, Vol. 1 Kyoto, 1981*, pages 325–330. IFAC, Laxenburg, 1982.

[603] E.D. Sontag and D.E. Stevenson. Remarks on multi-server, multi-priority queuing models related to mvs job scheduling. Technical Report TM-81-45281-1, Bell Telephone Labs., 1981.

[604] R.T. Bumby, E.D. Sontag, H.J. Sussmann, and W. Vasconcelos. Remarks on the pole-shifting problem over rings. *J. Pure Appl. Algebra*, 20(2):113–127, 1981.

[605] E.D. Sontag. On generalized inverses of polynomial and other matrices. *IEEE Trans. Automat. Control*, 25(3):514–517, 1980.

[606] E.D. Sontag. On quasireachable realizations of a polynomial response. In *Systems analysis (Conf., Bordeaux, 1978)*, volume 75 of *Astérisque*, pages 207–217. Soc. Math. France, Paris, 1980.

[607] E.D. Sontag. Nonlinear regulation, the piecewise linear approach. In *Proc.Princeton Conf.on Information Sciences and Systems, Princeton, March 1980*, 1980.

[608] M. L. J. Hautus and E.D. Sontag. An approach to detectability and observers. In *Algebraic and geometric methods in linear systems theory (AMS-NASA-NATO Summer Sem., Harvard Univ., Cambridge, Mass., 1979)*, volume 18 of *Lectures in Appl. Math.*, pages 99–135. Amer. Math. Soc., Providence, R.I., 1980.

[609] E.D. Sontag. On the length of inputs necessary in order to identify a deterministic linear system. *IEEE Trans. Automat. Control*, 25(1):120–121, 1980.

[610] E.D. Sontag and H.J. Sussmann. Remarks on continuous feedback. In *Proc. IEEE Conf. Decision and Control, Albuquerque, Dec.1980*, pages 916–921, 1980.

[611] E.D. Sontag. *Polynomial Response Maps*, volume 13 of *Lecture Notes in Control and Information Sciences*. Springer-Verlag, Berlin, 1979.

[612] E.D. Sontag. On the observability of polynomial systems. I. Finite-time problems. *SIAM J. Control Optim.*, 17(1):139–151, 1979.

[613] Y. Rouchaleau and E.D. Sontag. On the existence of minimal realizations of linear dynamical systems over Noetherian integral domains. *J. Comput. System Sci.*, 18(1):65–75, 1979.

[614] E.D. Sontag. On finitary linear systems. *Kybernetika (Prague)*, 15(5):349–358, 1979.

[615] E.D. Sontag. Realization theory of discrete-time nonlinear systems. I. The bounded case. *IEEE Trans. Circuits and Systems*, 26(5):342–356, 1979.

[616] W. Dicks and E.D. Sontag. Sylvester domains. *J. Pure Appl. Algebra*, 13(3):243–275, 1978.

[617] E.D. Sontag. On split realizations of response maps over rings. *Information and Control*, 37(1):23–33, 1978.

[618] E.D. Sontag. On first-order equations for multidimensional filters. *IEEE Trans. Acoustics, Speech, and Signal Processing*, 26:480–482, 1978.

[619] E.D. Sontag. Algebraic-geometric methods in the realization of discrete-time systems. In *Proc. Conf. Inform. Sci. and Systems, John Hopkins Univ. (1978)*, pages 158–162, 1978.

[620] E.D. Sontag. The lattice of minimal realizations of response maps over rings. *Math. Systems Theory*, 11(2):169–175, 1977.

[621] E.D. Sontag and Y. Rouchaleau. Sur les anneaux de Fatou forts. *C. R. Acad. Sci. Paris Sér. A-B*, 284(5):A331–A333, 1977.

[622] E.D. Sontag. On the internal realization of nonlinear behaviors. In A. Bednarek and L. Cesari, editors, *Dynamical Systems*, pages 93–497. Academic Press, New York, 1977.

[623] E.D. Sontag and Y. Rouchaleau. On discrete-time polynomial systems. *Nonlinear Anal.*, 1(1):55–64, 1976.

[624] E.D. Sontag. *On the internal realization of polynomial response maps*. PhD thesis, Univ. of Florida, Advisor: R.E. Kalman, 1976.

[625] E.D. Sontag. Linear systems over commutative rings: A survey. *Ricerche di Automatica*, 7:1–34, 1976.

[626] E.D. Sontag. On finitely accessible and finitely observable rings. *J. Pure Appl. Algebra*, 8(1):97–104, 1976.

[627] E.D. Sontag. On some questions of rationality and decidability. *J. Comput. System Sci.*, 11(3):375–381, 1975.

[628] E.D. Sontag. On linear systems and noncommutative rings. *Math. Systems Theory*, 9(4):327–344, 1975.

[629] E.D. Sontag. *Temas de Inteligencia Artificial*. PROLAM, Buenos Aires, 1972.