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Noise and noise reduction in coupled map lattice systems of different topologies with applications[1] BEHNAM KIA, SARVENAZ KIA, Department of Physics and Astronomy, University of Hawaii at Manoa, Honolulu, HI 96822, USA, JOHN LINDNER, Physics Department, The College of Wooster, Wooster,Ohio 44691, USA, SUDESHNA SINHA, Indian Institute of Science Education and Research (IISER), Mohali, Punjab, India, WILLIAM DITTO, Department of Physics and Astronomy, University of Hawaii at Manoa, Honolulu, HI 96822, USA — A model will be presented to demonstrate how the effects of local noise can be controlled in a variety of topologies in coupled map lattices. Then we calculate the optimal value of coupling parameters between different nodes of the lattice to obtain the maximum amount of noise reduction. We argue that the dynamics of the coupled map lattice functions as an averaging filter to reduce noise. We study this effect in different types of networks, including globally coupled and small world networks. Different numerical simulations are presented, and it is observed that there is agreement between the theoretical predictions and numerical simulations. We compare the results of this approach with the "majority wins" approach where in order to obtain noise robustness, a series of similar systems operate at the same time and the result of the majority is selected as the final result. We will demonstrate that our approach gives a higher level of noise robustness compared to the "majority wins" technique.

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