Photonic reservoir computing for post-processing optical communication signals

Apostolos Argyris, Julian Bueno, Miguel C. Soriano and Ingo Fischer

Instituto de Física Interdisciplinar y Sistemas Complejos IFISC (UIB-CSIC), Campus UIB, 07122, Palma de Mallorca, Spain

In the current investigation we evaluate the post-processing capability of a small-scale RC by employing a classification task in optical communication signals. Operating conditions of the RC that lead to complex dynamics, from the onset of multistability to fully developed chaos, are considered. At large distances and for signal bit rates of 10Gb/s or higher, fiber transmission impairments degrade the quality of the encoded information so that the latter is difficult to be recovered by real-time, direct-threshold, detection methods. Here we show that the nonlinear transformation of the above signals through the photonic-based RCs and the upcoming training with a ridge regression algorithm significantly improves the recovery of the bit stream.