Characterization of spatiotemporal chaos in a Kerr optical frequency comb and in all fiber cavities

Liu, Z.

Ouali, M.

Coulibaly, S.

Clerc, M. G.

Taki, M.

Tlidi, M.

 Complex spatiotemporal dynamics have been a subject of recent experimental investigations in optical frequency comb microresonators and in driven fiber cavities with Kerr-type media. We show that this complex behavior has a spatiotemporal chaotic nature. We determine numerically the Lyapunov spectra, allowing us to characterize different dynamical behavior occurring in these simple devices. The Yorke-Kaplan dimension is used as an order parameter to characterize the bifurcation diagram. We identify a wide regime of parameters where the system exhibits a coexistence between the spatiotemporal chaos, the oscillatory localized structure, and the homogeneous steady state. The destabilization of an oscillatory localized state through radiation of counter-propagating fronts between the homogeneous and the spatiotemporal chaotic states is analyzed. To characterize better the spatiotemporal chaos, we estimate the front speed as a function of the pump intensit