# Bound pulse trains in arrays of coupled spatially extended dynamical systems

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We study the dynamics of an array of nearest-neighbor coupled spatially distributed systems each generating a periodic sequence of short pulses. One example of such setup is an array of coupled mode-locked lasers, where each element is described by a set of delay-differential equations [1].

We demonstrate that unlike a solitary laser generating a train of equidistant pulses, laser array can produce a sequence of clusters of closely packed pulses, with the distance between individual pulses depending on the coupling phase. This new regime associated with the formation of locally coupled pulse trains due to a balance of attraction and repulsion between them is different from the soliton bound states reported earlier in different laser, plasma, chemical, and biological systems. We propose an analytical description of the observed phenomenon [2], which is in a good agreement with the results of direct numerical simulations of a model system describing an array of coupled mode-locked lasers.

[1] Vladimirov A. G., Turaev D., Model for passive mode locking in semiconductor lasers, *Physical Review A* **72**:033808, 2005.

[2] Puzyrev D., Vladimirov A. G., Pimenov A., Gurevich S. V., Yanchuk S., Bound pulse trains in arrays of coupled spatially extended dynamical systems, *Physical Review Letters* **119**:163901, 2017.