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Coherent structures in non-local active-dissipative equations TE-SHENG LIN, Department of Mathematical Sciences, Loughborough University, MARC PRADAS, SERAFIM KALLIADASIS, Department of Chemical Engineering, Imperial College London, DEMETRIOS PAPAGEORGIOU, Department of Mathematics, Imperial College London, DMITRI TSELUIKO, Department of Mathematical Sciences, Loughborough University — We investigate a non-local weakly nonlinear equation arising in the modeling of wave dynamics on electrified falling films. The equation is a generalized Kuramoto-Sivashinsky (gKS) equation with a non-local term representing the imposed electric field. As for the case of the usual gKS equation, we find that sufficiently strong dispersion arrests the spatio-temporal chaos and the solutions evolve into arrays of pulses, each one of which resembles an infinite-domain pulse. Such pulses interact with each other and may form bound states. The Shilnikov-type approach for analyzing bound states is not applicable to non-local equations. We therefore develop an accurate weakly interaction theory for the pulses that allows us to analyze the attraction and repulsion of the pulses and the existence of bound states. The non-locality of the equation results in the fact that the infinite-domain pulse has algebraically decaying tails (in contrast to exponentially decaying tails for the local equation), which has strong effect on the interaction of the pulses. We compare the interaction theory with numerical simulations of the full equation and find very good agreement.

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