Pulse interaction in non-local active-dissipative systems modeling falling liquid films with external effects DMITRI TSELUIKO, TE-SHENG LIN, Loughborough University, MARC PRADAS, SERAFIM KALLIADASIS, DEMETRIOS PAPAGEORGIOU, Imperial College London, MARK BLYTH, University of East Anglia — We analyze pulse interaction in active-dissipative systems that arise in the study of falling liquid films in the presence of various external effects, e.g. an applied electric field or turbulent gas flow. Such effects result in additional non-local terms in the form of pseudo-differential operators. We analyze both weakly nonlinear and fully nonlinear reduced model equations. Our analysis is an appropriate extension of our previous studies of pulse interaction for local equations, both weakly nonlinear and model equations [1,2], to non-local ones. We compare the theoretical predictions with numerical results for reduced model equations and Stokes flow. It is found that non-locality strongly influences pulse interactions and results in several features that are not present in local equations.

[1] D. Tseluiko and S. Kalliadasis 2014 "Weak interaction of solitary pulses in active dispersive-dissipative nonlinear media," IMA J. Appl. Math. **79** 274-299.
[2] M. Pradas, D. Tseluiko and S. Kalliadasis 2011 "Rigorous coherent-structure theory for falling liquid films: Viscous dispersion effects on bound-state formation and self-organization," Phys. Fluids **23** 044104.

Dmitri Tseluiko
Loughborough University