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Spatial response of a film flowing down a fiber CAMILLE DUPRAT, CHRISTIAN RUYER-QUIL, FREDERIQUE GIORGIUTTI-DAUPHINE, Fast Laboratory Universite Paris Sud — We consider the stability and the nonlinear dynamics of a liquid viscous film flowing down a vertical fiber. This instability involves different mechanisms: the Rayleigh-Plateau instability promoted by the fiber curvature, the advection by the flow and the hydrodynamic instability of a falling film due to inertia. The study of the initial response of the flow to natural noise shows a well-defined transition between an absolute and a convective instability [1]. In the convective case, the film behaves as a selective noise amplifier and its spatial response to periodic forcing is studied through experimental data and comparisons to the solutions of a model in the nonlinear regime. This model includes all physical effects, especially viscous dispersion and inertia [2]. We found that the characteristics of the waves strongly depend on the frequency. For high forcing frequency, the formation of saturated wavetrains is observed, whereas at low forcing frequencies a sequence of pairing leads ultimately to solitary-like waves with high velocities and amplitude. The role of inertia on the shape and steepening of the wave front is evidenced. The model recovers the main features of the waves such as velocity, amplitude, and wavelength. [1] C. Duprat, C. Ruyer-Quil, S. Kalliadasis and F. Giorgiutti-Dauphiné, Phys. Rev. Letters, 98, 244502 (2007) [2] C. Ruyer-Quil, P. Treveleyan, F. Giorgiutti-Dauphiné, C. Duprat and S. Kalliadasis, J. Fluid. Mech., 603, pp 431-462 (2008)

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