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Stability of Liquid Films on Strings VINEET NAIR, ISHAN SHARMA, VISWANATHAN SHANKAR, Indian Inst of Tech-Kanpur — The dynamics and stability of liquid films on rigid substrates is a well studied problem with recent studies extending the analysis to flexible substrates. Here, we study the stability of a liquid film on a string. The string is a one-dimensional continuum and we consider it to be linear elastic, isotropic, homogeneous, and flexible. It is assumed that the slope made by the string is small and that the motion is planar and the displacements are in transverse direction. The liquid film is a two-dimensional continuum and we consider it to be a Newtonian fluid with uniform density, viscosity, and surface tension. We consider the cases where the string has an initial horizontal configuration and inclined configuration, including both the finite and infinite cases. We use the lubrication approximation to simplify the governing equations and boundary conditions. The fluid-solid coupling results in a set of two coupled nonlinear partial differential equations in film thickness and string displacement. Subsequently, a linear stability analysis will be carried out and the equations will be solved numerically. The ultimate objective of this study is to understand the behavior of liquid film flow over translating structures such as strings and beams that may or may not be of finite extent

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