Review report on the manuscript (LM17723) entitled “Controlling the dewetting morphologies of thin liquid films by switchable substrates” by S. Zitz, A. Scagliarini, and J. Harting.

The manuscript by Zitz et al. analyzed the dewetting of thin liquid films on switchable and adaptive substrates both numerically and semi-analytically. The work is systematic and provides some interesting results. However, I cannot recommend the publication in Physical Review Letters mainly due to the concerns listed below.

(1) It seems impossible to construct the patterns described by Equation (3) in a real experiment, making the current research less attractive.

(2) This work is completed based on the lubrication equation for the thin film flows. From theoretical/mathematical aspects, the novelty of this work, in my opinion, is not strong enough. This lubrication model employed here was proposed about 40 years ago and has been thoroughly investigated [1,2]. There are no improvements or modifications to the model in this work. Additionally, the model for the rupture time comes from a simple scaling analysis, which is not very convincing when considering other classical mathematical approaches, such as linear instability analysis, similarity transformation, etc.

(3) The mobility function in Equation (1) contains the slip length δ. But there is no further information in this work. Is the slip length of a patterned substrate constant? If so, it is quite unreasonable because a hydrophobic substrate is usually more slippery than a hydrophilic one. Moreover, previous works had showed that the slip is crucial to the interface dynamics [3,4], which should be taken into account.

(4) According to the fluid parameters displayed in the supplemental material, the initial thickness of the film is about 4 nm. Thermal fluctuations had been shown to play a key role at this scale [5,6], which might affect the dynamics seriously.

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[4] Zhao C, Zhang Y, Si T. Slip-enhanced Rayleigh–Plateau instability of a liquid film on a fibre[J]. Journal of Fluid Mechanics, 2023, 954: A46.

[5] Fetzer R, Rauscher M, Seemann R, et al. Thermal noise influences fluid flow in thin films during spinodal dewetting[J]. Physical Review Letters, 2007, 99(11): 114503.

[6] Clavaud C, Maza-Cuello M, Frétigny C, et al. Modification of the Fluctuation Dynamics of Ultrathin Wetting Films[J]. Physical Review Letters, 2021, 126(22): 228004.