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Motion of self-rewetting drop on a substrate with a linear temperature gradient ZELAI XU, JUNYUAN CHEN, HAORAN LIU, HANG DING, University of Science and Technology of China, KIRTI SAHU, Indian Institute of Technology Hyderabad India — We numerically investigate the dynamic of a self-wetting drop placed on a substrate with a linear temperature gradient. Two distinct drop behaviours, namely, the displacement and the stretching, are observed when it is placed at the location of the minimum surface tension. In the displacement regime, the drop spreads slightly and moves towards one side of the substrate. In contrast, in the stretching regime, the drop continues to spread about its initial location as it experiences a higher surface tension gradient with the increase in the wetting area. Theoretical models with and without viscous drag calculated using the lubrication approximation have been developed in order to predict the critical condition at which the drop undergoes the transition between the displacement and the stretching regimes. By changing the initial position of the drop, it is found that in the displacement regime, initial the migration of the drop obeys an exponential function with time, but it diverges at the later stage due to the increase in the drop deformation. On the other hand, in the stretching regime, we observe two scaling laws, with the wetted length of the drop increasing with time, t as $t^{1/2}$ and t, for different combinations of the contact angle and the themocapillary influence.

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