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Theoretical models for the stability of a liquid ring on a substrate<sup>1</sup> JAVIER A. DIEZ, ALEJANDRO G. GONZÁLEZ, Instituto de Física Arroyo Seco (CIFICEN-CONICET), Universidad Nacional del Centro de la Provincia de Buenos Aires, Tandil, Argentina, LOU KONDIC, Department of Mathematical Sciences, New Jersey Institute of Technology, University Heights, Newark, NJ 07102 — A viscous incompressible fluid ring on a partially wetting substrate is studied within the framework of long-wave theory. We found that static equilibria are possible in the presence of contact angle hysteresis. Their linear stability is carried out by using a slip model. A quasi-static approximation is also implemented to analyze longer times. This latter approach takes into account the concomitant variation of the instantaneous growth rates of the modes responsible for either collapse of the ring into a single central drop or breakup into a number of droplets along the ring circumforence. We compare the results of these models with those obtained from nonlinear numerical simulations based on a complementary disjoining pressure model. We find remarkably good agreement regarding the expected number of drops forming during the breakup process. (J. Fluid Mech. 718, 246 (2013))

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Javier A. Diez Instituto de Física Arroyo Seco (CIFICEN-CONICET), Universidad Nacional del Centro de la Provincia de Buenos Aires, Tandil, Argentina

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