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The initial regime of drop coalescence CHRISTOPHER ANTHONY, MICHAEL HARRIS, OSMAN BASARAN, Purdue University — Drop coalescence plays a key role in both industry and nature. Consequently, study of the phenomenon has been the focus of numerous experimental, computational and theoretical works to date. In coalescence, two drops come into contact and a liquid bridge forms between them. As time advances, this bridge grows from microscopic to macroscopic scales. Despite the large volume of work dedicated to this problem, currently experiment, theory, and computation are not in perfect agreement with respect to the earliest times following the initial contact of the drops. Experiments report an initial regime where the radius of the connecting bridge grows linearly in time before a transition to either a Stokes regime or an inertial regime where either viscous or inertial forces balance capillary force. In the initial linear regime, referred to as the inertially-limited viscous regime, all three forces are thought to be important. This is in contrast to theory which predicts that all coalescence events begin in the Stokes regime. We use high accuracy numerical simulation to show that the existing discrepancy in the literature can be resolved by paying careful attention to the initial conditions that set the shape and size of the bridge connecting the two drops.

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