

Abstract Submitted
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Asymptotic Transitions and Interactions of Interfacial Instabilities in Shear Flows¹ SVETLANA SUSHCHIKH, THEO THEOFANOUS, UCSB
— We consider global behaviors of instabilities in miscible and immiscible two-phase flows—pressure or shear driven superposed layers. We find Yih-like instabilities with diffuse layers occupying as much as 10% of the flow even at rather low Reynolds numbers. These approach asymptotically the Yih instability as the diffuse layer thickness decreases, and we quantify this asymptotic transition in terms of the Peclet number. Then we find both Yih and Yih-like instabilities to transition to the inviscid mode (corresponding inviscid problem) at some value of the Reynolds number that depends on the viscosity ratio and the Peclet number (in Yih-like case), including stability if the inviscid mode is stable. Finally at high enough Reynolds number, we show that Yih and Yih-like instabilities can be in mutual influence with the T-S mode when there is some proximity in the respective critical layers. When this proximity is even closer, this influence becomes a strong interaction, and transformation of both into a new kind of instability.

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