Abstract Submitted
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A Dual Scale Model for Reconstructing Sub-Filter Shear Driven Instabilities[1] AUSTIN GOODRICH, MARCUS HERRMANN, Arizona State University — A method to compute sub-filter shear-induced velocity on a liquid-gas interface for use in a dual-scale LES-DNS model is presented. The method computes velocity perturbation growth rates by constructing a linear eigenvalue problem based on the well known Orr-Sommerfeld equation using a velocity profile approximated with an error function scaled by the far-field velocities and a prescribed boundary layer thickness. The Orr-Sommerfeld equation, along with appropriate boundary and interface conditions, is then solved numerically with a Chebyshev collocation method as outlined by Schmid and Henningson (2001). The eigenfunctions of the Orr-Sommerfeld equations are expanded into Chebyshev polynomials and evaluated at their Gauss-Lobatto points for spectral accuracy, resulting in an algebraic eigenvalue that can be solved using a standard linear algebra package. With the unstable growth rates computed, the streamfunction definitions are used to compute the normal velocities at the liquid-gas interface. The Chebyshev method is tested under a variety of conditions, and results are presented and compared against prior literature.

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