Stability analysis for air film drag reduction[1] CHINAR APHALE,
WILLIAM SCHULTZ, STEVEN CECCIO, University of Michigan — A linear stability analysis of an air-water interface is studied for basic understanding of air film physics applied to a ship hull for drag reduction purposes. Three different flows are studied. In the first case, viscosity is considered and is a special case of the problem studied by Yih (1967) when the thickness of two layers is the same and a long-wave stability analysis is performed. The second and third case are inviscid basic flows with unequal thicknesses and inviscid and viscous velocity profiles, respectively. Unstable conditions are determined according to Rayleigh theorem. Interesting inferences are drawn if limits are considered on thicknesses and wave numbers that might be considered for plenums on the hull surface.

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