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Eigenvalue analysis of membrane stability in inviscid flow CHRISTIANA MAVROYIAKOUMOU, SILAS ALBEN, University of Michigan — We study the stability of a thin membrane with a vortex sheet as a nonlinear eigenvalue problem in the parameter space of membrane mass and pretension. When both membrane ends are fixed, the stability boundary is fairly simple: light membranes become unstable by a divergence instability and heavy membranes appear to lose stability by flutter and divergence, which occurs for a pretension value that increases with the membrane mass. With the leading edge fixed and trailing edge free, or both edges free, the membrane eigenmode shapes become more complicated and eigenmodes transition in shape across the stability boundary. We compare the eigenvalue analysis with simulations of the corresponding initial value problem in the small-amplitude (growth) regime.

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