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The sensitivity of stratified flow stability to base flow modifications[1] KEVIN CHEN, GEOFFREY SPEDDING, University of Southern California — We present a novel theory that determines the sensitivity of linear stability to changes in the density or velocity of a base flow. The sensitivity is based on global direct and adjoint eigenmodes of the linearized Boussinesq equation, and is inspired by constant-density sensitivity analysis. The theory can be applied broadly to incompressible flows with small density variations, but it specifically provides new insight into the stability of density-stratified flows. Examples are given for the flows around a transverse thin plate at a Reynolds number of 30, a Prandtl number of 7.19, and Froude numbers of ∞ and 1. In the unstratified flow, the sensitivity is largest in the recirculation bubble; the stratified flow, however, exhibits high sensitivity in regions immediately upstream and downstream of the bluff body.

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