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Exchange of Stabilities in Couette Flow between Cylinders with Navier-Slip Conditions PABLO SUAREZ, Delaware State University, ISOM HERRON, Rensselaer Polytechnic Institute — Viscous Couette flow is derived for flow between two infinitely long concentric rotating cylinders with Navier slip on both. Its axisymmetric linear stability is studied within a regime that would be hydrodynamically stable according to Rayleigh's criterion: opposing gradients of angular velocity and specific angular momentum, based on the rotation rates and radii of the cylinders. Stability conditions are analyzed, by methods based on those of Synge and Chandrasekhar. For sufficiently small slip length on the outer cylinder no instability occurs with arbitrary slip length on the inner cylinder. As a corollary, slip on the inner cylinder is shown to be stabilizing, with no slip on the outer cylinder. Two slip configurations are investigated numerically, first with slip only on the outer cylinder, then second with equal slip on both cylinders. It is found that instability does occur (for large outer slip length), and the principle of exchange of stabilities emerges. The instability disappears for sufficiently large slip length in the second case; Rayleigh's criterion provides an explanation for these phenomena.

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