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Linear Instability Mechanisms of Supersonic Flow Over a Hollow Cylinder Flare Model[1] HELIO QUINTANILHA JR., NICOLAS CERULUS, VASSILIS THEOFILIS, University of Liverpool — Instability of compressible laminar and transitional flow over an axisymmetric hollow cylinder flare configuration is addressed within the framework of linear BiGlobal analysis. The laminar basic state is topologically identical to spanwise homogeneous planar compression ramp flow and is obtained using high-resolution axisymmetric laminar direct numerical simulations. The inflow base flow profiles are provided by solution of the compressible axisymmetric boundary layer equations, such that the leading-edge shock is naturally excluded from the simulation domain. The recompression shock-system is fully resolved in the basic flow and included in the stability analysis. The global (modal) eigenvalue problem and the (non-modal/transient growth) singular value decomposition are solved using the LiGHT solver. Results obtained point to instability mechanisms analogous to those discovered in the planar compression ramp flow, namely two- and three-dimensional self-excitation of the laminar recirculation bubble, modified by the essential inclusion of the recompression shock. Comparisons with experimental results will be presented during the talk.

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