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Linear stability analysis of supersonic jet screech MICHAEL KARP, TIM FLINT, M. J. PHILIPP HACK, Center for Turbulence Research, Stanford University — Jet screech is an undesirable flow phenomenon which can pose severe limitations on the operation of jet engines. Screech is commonly understood as a feedback cycle involving interactions between instability waves, shear layers, shocks and acoustic waves. Our study seeks to advance the insight into the physics of jet screech by means of global linear stability theory. We consider steady laminar axisymmetric jets at supersonic conditions. Both under-expanded and perfectly expanded jets are investigated at various exit Mach numbers. The analysis connects the occurrence of screech to an absolute instability of the under-expanded jet. The features of the eigenmodes are discussed and their relevance to the elements of the screech cycle is explored. An adjoint analysis quantifies the receptivity of jet screech to internal and external perturbations.

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