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**Stability Characteristics of Open Cavities at High Mach Numbers** PARSHWANATH DOSHI, RAJESH RANJAN, DATTA GAITONDE, Ohio State Univ - Columbus — Rectangular open cavity flows at supersonic freestream Mach numbers, and a length-to-depth ratio of 6 are studied using linear operator-based modal analysis techniques. The flow conditions are representative of those encountered during high-speed flight. Stability analyses indicate that increasing the Mach number stabilizes both two- and three-dimensional modes, however, their structures indicate increasing decoupling from the shear layer that bridges the cavity. The present observations thus support the hypothesis that at high enough Mach numbers, the behavior of the system resembles that of an acoustic box resonator. Subsequent resolvent analyses on this flow reveal that the amplification rates of individual modes are influenced by incoming forcing from the freestream, which is further confirmed by the method of characteristics. The influence of the inclination angle of the aft wall of the cavity on the shear-layer oscillations is also examined. It is observed that increasing the angle weakens the associated feedback loop and changes the nature of the instabilities. The results have important implications for safety in the operation of aircraft cavity bays at supersonic flight conditions, as well as in cavity flameholders in supersonic combustion applications.

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