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**Bi-global Stability Analysis of Compressible Open Cavity Flows**<sup>1</sup> YIYANG SUN, KUNIIHIKO TAIRA, LOUIS CATTAFESTA, Florida State University, LAWRENCE UKEILEY, University of Florida — The effect of compressibility on stability characteristics of rectangular open cavity flows is numerically examined. In our earlier work with two-dimensional direct numerical simulation of open cavity flows, we found that increasing Mach number destabilizes the flow in the subsonic regime but stabilizes the flow in the transonic regime. To further examine the compressibility effect, linear bi-global stability analysis is performed over the same range of Mach numbers to investigate the influence of three-dimensional instabilities in flows over open cavities with length-to-depth ratios of 2 and 6. We identify dominant eigenmodes for varied Mach numbers and spanwise wavelengths with respect to two-dimensional stable and unstable steady states. Over a range of spanwise wavelengths, we reveal the growth/damp rates and frequencies of the dominant global modes. Based on the insights from the present analysis, we compare our findings from global stability analysis with our companion three-dimensional flow control experiments aimed at reducing pressure fluctuation caused by cavity flow unsteadiness.

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- Prefer Oral Session  
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Yiyang Sun  
ys12d@my.fsu.edu  
Florida State University

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