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Linear evolution of compressible Görtler instability triggered by freestream vortical disturbances[1] SAMUELE VIARO, PIERRE RICCO, The University of Sheffield — The linear development of unsteady compressible Görtler vortices is investigated theoretically and numerically. A rigorous initial boundary value framework (IBV) is derived from the full compressible Navier-Stokes equations, supplemented with initial and outer boundary conditions that synthesize the forcing of the oncoming freestream vortical disturbances (FSVD). A simplified eigenvalue framework (EV) is then derived by neglecting the interactions with FSVD. Agreement with IBV is found sufficiently downstream where FSVD are fully decayed. The matching occurs only between the normalized IBV and EV profiles due to the lack of information from the initial conditions in the EV problem. Accuracy of the EV solution is improved when non-parallel effects are considered. Incompressible steady vortices are most unstable and evolve in a wall layer that shrinks as the streamwise coordinate increases. As the Mach number and frequency increase the flow stabilizes and vortices move toward the edge of the boundary layer. In addition, the streamwise wavelength of the perturbation approaches the freestream value when stability increases. Finally, an asymptotical analysis is developed to show the different stages in which the linear vortices develop.

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