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Fluid-plasma interaction in compressible unstable flows LUCA MASSA, Center for Exascale Simulation of Plasma-Coupled Combustion (XPACC) University of Illinois — The receptivity of the boundary layer discrete modes to dielectric barrier discharge (DBD) actuation is studied to improve the understanding of the interaction between non-equilibrium plasma and fluid in convectively amplified vortical layers. The momentum transfer induced by a DBD patch at various Reynolds numbers is evaluated using an adaptive mesh refinement computational solver in the Mach number regime 0.8-2.0. The energy of the induced modal perturbation is determined by weighting such a source term with the corresponding adjoint eigenfunctions. Conditions of maximum overlapping between the adjoint and the source term define the regimes of maximum receptivity and the locations of optimal placement of the DBD patch at different Mach and Reynolds numbers. The interaction between non-equilibrium plasma and the jet in cross flow is also being studied to determine the ability of DBD patches to influence mixing in the compressible regime, thus improving flame-holding in plasma assisted ignition and combustion.

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