DNS and the theory of receptivity in a hypersonic boundary layer
ANATOLI TUMIN, The University of Arizona, XIAOWEN WANG, XIAOLIN ZHONG, UCLA — Direct numerical simulation of receptivity in a boundary layer over a sharp wedge of half-angle of 5.3 degrees was carried out with perturbations introduced into the flow by periodic-in-time blowing-suction through a slot. The free stream Mach number is equal to 8. The perturbation flow field at a small distance from the slot was decomposed into normal modes with the help of the multimode decomposition technique based on the spatial biorthogonal eigenfunction system. Filtered-out amplitudes of two discrete normal modes of interest are compared with the linear receptivity problem solution. The results illustrate how the multimode decomposition technique may serve as an efficient tool for validation of DNS results and for gaining insight into the flow dynamics.

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