Numerical modeling of laser energy deposition for supersonic flow control RAJIB MAHAMUD, ALBINA TROPINA, Texas AM Univ — Non-equilibrium plasma generated by the dual-pulse laser in the supersonic flow at high altitudes was studied numerically. A mathematical model includes species, momentum, electronic, vibrational and gas temperature conservation equations for the multi-component ionized air in the high speed flow. The simulations suggest that the plasma kernel and the formed shock wave distort the boundary layer and reduce the surface pressure. It was shown, that non-equilibrium plasma reduces a surface pressure for a longer time range compared with equilibrium plasma generated by the single-pulse laser energy deposition. Numerical results also show that the vorticity generation due to baroclinity and the plasma wake interaction with the surface are the possible mechanisms of the drag reduction.

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