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Electron acoustic wave propagation in a two-electron-temperature plasma layer applied to the problem of hypersonic vehicle communication[1] VLADIMIR SOTNIKOV, University of Nevada at Reno, NV 89557, DAVID ROSE, Voss Scientific LLC, NM 87108 — Problem of electromagnetic wave propagation through a plasma sheath surrounding reentry vehicles and vehicles traveling at hypersonic velocities at high altitudes attracts the attention of many researchers. High plasma density inside a plasma sheath around a hypersonic vehicle prevents propagation of electromagnetic waves with the frequencies below the local plasma frequency. This results in RF frequency communication problems. One possibility to mitigate this problem is to induce a two-temperature electron distribution inside the plasma sheath. This allows electron acoustic waves (EAWs) with frequencies well below the local plasma frequency (fp $\sim$ 9 GHz) to propagate through a plasma layer, enabling communication. A small hot electron population is produced in the sheath by injection of an energetic electron beam in the sheath from the vehicle. Excitation, propagation, and attenuation of EAWs inside a plasma sheath in the presence of an electron beam has been investigated as well as efficiency of transformation of EAWs into electromagnetic waves on the sheath boundary.

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