

Abstract Submitted
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Why is the Mach probe formula expressed as $R = J_{up}/J_{dn} = \exp[KM_\infty]$? KYU-SUN CHUNG, Hanyang University — Normalized drift velocity of the flowing plasmas can be deduced by a Mach probe, which has two directional probes at opposite sides. The relation between the ratio(R) of the upstream ion saturation current density(J_{up}) to the downstream(J_{dn}) and the normalized drift velocity ($M_\infty = V_d/\sqrt{T_e/m_i}$) of plasma has generally been fitted into an exponential form as $R = J_{up}/J_{dn} = \exp[KM_\infty]$, where K is a calibration factor depending upon the magnetic flux density, collisionality, viscosity, and ion temperature of plasmas. Without going into detailed theories for various conditions of plasmas and probes, a simple explanation is given in terms of decaying current density in the downstream region. Existing theories and experiments of Mach probes in magnetized and unmagnetized flowing plasmas are summarized along with key physics and comments.

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