COMPARATIVE PLASMA TAILS OF VENUS AND COMETS

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A review of the current models of solar wind flow in the plasma tails of weakly magnetized bodies is presented. The measurements conducted with the Mariner 5 spacecraft, the Venera 9 and 10 and the PVO orbiters in the Venus tail, and with the ICE spacecraft in the tail of Comet Giacobini-Zinner, reveal common plasma properties which suggest that similar physical processes are operative in the plasma environment of both bodies. Most notable is the observation of decreased flow velocities and enhanced plasma temperatures in the vicinity of their plasma tails. In Venus, the measured velocity and temperature fields are consistent with the effects of frictional forces between the mass-loaded ionosheath flow and the ionosphere along the (magnetic) polar regions of the ionopause. It is argued that similar conditions exist at a cometary ionopause and that the distribution of magnetic fluxes in a cometary tail is controlled by the entry of plasma fluxes from the (magnetic) polar regions of the comet's ionospheric obstacle. This question is further addressed in connection with the two-step shape of the magnetic profile measured across the tail of Comet Giacobini-Zinner. It is suggested that the low intensity outer increases of the magnetic lobes are associated with the draping of the interplanetary magnetic field lines around the comet's ionospheric obstacle, and that the higher intensity increases seen in the inner regions of the magnetic lobes are due to an additional compression of magnetic fluxes produced by the entry of plasma particles into the tail.