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Plasma-plasma interaction in space: results of 3D multi-ion fluid simulations

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A 3D multi-fluid code is used to study the interaction of the solar wind with different non-magnetized bodies, as weakly outgassing comets, Mars and Titan. Due to the different dynamics of solar wind protons and newly born ions from the 'obstacles', asymmetric plasma and magnetic field structures are produced around the bodies. Moreover, the mass loading process is accompanied by sharp changes of the ion composition. The resulting interaction pattern is completely different from the picture which arises from one-fluid MHD simulations for the same conditions. Implications to current and future space missions are discussed.