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Hot electrons downstream of the termination shock and the incompressibility of the heliosheath plasma

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We consider a fast magnetosonic multifluid representation of the solar wind termination shock and assume that the shock transition occurs in two steps: First the upstream plasma is subjected to a strong electric field decelerating the supersonic ion flow and accelerating the electrons to high velocities. In this part the electric forces strongly dominate over Lorentz forces, i.e. the de-magnetization region. By means of the Vlasow theorem we obtain the distribution function and the bulk velocity of the electrons. We can show that the shocked electrons experience a strong energy gain in form of overshoot kinetic energies. In the second part of the shock, convected magnetic fields lead to Lorentz forces that compete with electric forces and take care of winding up the electrons into a shell distribution which stores about 3/4 of the upstream ion kinetic energy. Due to this the electron fluid represents the dominating pressure in the heliosheath plasma which thus, as we show, behaves incompressible under such conditions.