Collisionless perpendicular shock waves in multi-fluid model

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   We discuss about the supercritical perpendicular shocks by using a method similar to the hybrid simulation, in which we treat the incoming and the reflected ions as independent elements of a multi-fluid, whereas the electrons as charge neutralizing background. We iteratively seek for self-consistent profile of ion distribution and electromagnetic field of stationary shock, for a given set of

   upstream shock parameters and the fraction of reflected ions. In our case, shock structure becomes stationary at low thermal velocity, and nonstationary at high thermal velocity. This is not agree with the result of PIC simulation. In the present study, we discuss differences of these results. We incorporate the way of analytical determination of ion reflection rate in our self-consistent iteration, and discuss self-consistent determination of the shock structure in multi-fluid model.