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Weak interplanetary shocks and their propagation through the magnetosheath

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We have identified several interplanetary shocks in the solar wind for which measurements in the magnetosheath were available. The principal condition for our selection was that one spacecraft was in the magnetosheath prior the shock arrival and remained in the magnetosheath after the shock passage. It limits our set to weak interplanetary shocks. An analysis of these events reveals an evolution of the shock parameters in the solar wind but the changes of the magnetic field and plasma parameters across the discontinuity observed in the magnetosheath often differ significantly from those in the solar wind. Moreover, the slope and magnitude of parameter jumps on the discontinuity depend on the spacecraft location. A statistical processing of selected events lead to a conclusion that the propagation speed of the shock decreases in the magnetosheath. These conclusions are supported by MHD modeling of the shock propagation. The model shows that the originally planar shock front is curved in the magnetosheath because the shock deceleration is larger near the magnetopause.The profiles of magnetosheath parameters resulting from the model repeat observed features.