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Comparison of model bow shock locations with two-point observations

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Changes of the bow shock location induced by variations of upstream parameters can be described by several statistical models. These models are usually scaled by the solar wind dynamic pressure, Mach numbers and upstream magnetic field. The models are based on a statistical processing of bow shock crossings observed by a single spacecraft. Such crossings locate the bow shock in motion, i.e., in non-equilibrium state and this fact can be a source of significant errors. We have identified about 200 bow shock crossings observed by a closely ($<$1 RE) spaced INTERBALL-1 and MAGION-4 spacecraft and divided them into two groups. The crossings in the first group were observed by one spacecraft only and the bow shock spent a long time between them. In such cases, the bow shock location is known with an error determined by the spacecraft separation along the bow shock normal and this location can be directly compared with the model. The crossings in the second group were observed by both spacecraft. We have estimated the bow shock speed and used it as a measure of a deviation of the observed bow shock location from the equilibrium position. The results of our analysis are compared with predictions of bow shock models.