[구SE-17] A Comparison of CME Arrival Time Estimations by the WSA/ENLIL Cone Model and an Empirical Model

Soojeong Jang[1], Yong-Jae Moon[1,2], Kyoung-Sun Lee[2], HyeonOck Na[1]
[1]*School of Space Research, Kyung Hee University*
[2]*Department of Astronomy and Space Science, Kyung Hee University*

In this work we have examined the performance of the WSA/ENLIL cone model provided by Community Coordinated Modeling Center (CCMC). The WSA/ENLIL model simulates the propagation of coronal mass ejections (CMEs) from the Sun into the heliosphere. We estimate the shock arrival times at the Earth using 29 halo CMEs from 2001 to 2002. These halo CMEs have cone model parameters from Michalek et al. (2007) as well as their associated interplanetary (IP) shocks. We make a comparison between CME arrival times by the WSA/ENLIL cone model and IP shock observations. For the WSA/ENLIL cone model, the root mean square(RMS) error is about 13 hours and the mean absolute error(MAE) is approximately 10.4 hours. We compared these estimates with those of the empirical model by Kim et al.(2007). For the empirical model, the RMS and MAE errors are about 10.2 hours and 8.7 hours, respectively. We are investigating several possibilities on relatively large errors of the WSA/ENLIL cone model, which may be caused by cone model velocities, CME density enhancement factor, or CME-CME interaction.

[구SE-18] The effect of ion to electron mass ratio on Ion beam driven instability and ion holes by PIC simulation

Jinhy Hong[1], Ensang Lee[2], Kyoungwook Min[1], George.K Parks[3]
[1]*Department of Physics, KAIST , Daejeon, Korea*
[2]*School of Space Research, KHU, Yongin, Korea*
[3]*Space Science Lab, UCB, Berkeley, USA*

Previous simulations posed a problem that they used reduced ion to electron mass ratios to save computation time. It was assumed that ion and electron dynamics are sufficiently separated, but it was not clearly verified. In this study, we examine the effect of ion to electron mass ratios on the generation of ion holes by ion beam driven instability. Ion holes are generated via electron holes in an applied electric field with the given initial condition. First, the ion acoustic instability is excited and nonlinearly develops. After the ion acoustic instability nonlinearly develops, the ion two-stream instability is excited and develops into ion holes. This implies that the previously suggested ion beam driven instability is strongly affected by the coupling between ions and electrons and the ion to electron mass ratio is important on the development of the instability. The energy transition and detail variation is different as reduced mass ratio under the same observation value based on FAST satellite. Although, the parameters are rescaled by conserving the kinetic energy to obtain the proper results, the nonlinear evolution is not perfectly identical.