

Shock Passage Prediction Using Three-dimensional Simulation

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Predicting an arrival time and a scale of a CME-caused shock wave is important for space weather. We have developed a prediction system of passage time of CME-caused shock wave. The system has web interface to input parameters and to display results, and use three-dimensional interplanetary simulation code. Our three-dimensional code is based on adaptive mesh refinement technique (Khokhlov 1998¹, Ogawa et al. 2002³, and Noro et al. 2002²) and 3rd order Roe-MUSCL algorithm. A simulation is executed in a cubic simulation box with a side length of 500 solar radius. A side length of the minimum cell is 0.12 solar radius. Execution time is about 5 hours when 8 CPUs on 1 node are used. User inputs parameters of solar wind and CME and submit a job to super computer, then snapshots of progress and resulting passage time are output. We display some pictures of our system and show results of simulation.

Keywords: coronal mass ejection; interplanetary shock wave; three-dimensional simulation.

References

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