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Three-Dimensional Global Simulations of CME-Driven Shock Waves TAMAS GOMBOSI, University of Michigan, IGOR SOKOLOV, WARD MANCHESTER, CSEM, University of Michigan, JOZSEF KOTA, University of Arizona — Fast Coronal Mass Ejection (CME) events are characterized by a sudden release of energy and mass from the solar conrona which naturally cause the generation of powerful interplanetary shock waves of a speed ranging from 500 to 3500 km/s. These shock waves are large-scale disturbances to the interplanetary medium that accelerate particles found in gradual solar energetic particle (SEP) events and supra- thermal ions. The acceleration process depends strongly on shock speed and geometry which both exhibit significant temporal and spatial variation. Quantitative studies using global three-dimensional simulations allow to find and predict these complicated magnetic field structures as they propagate from the low corona to 1 AU. Furthermore, we are able to distinguish shock compressed solar wind plasma from CME ejecta in synthetic white-light images which are consistent with coronagraph observations. Capturing such shock is a necessary step in building a quantitative model of SEP acceleration and transport that can be used to forecast and mitigate the radiation hazards for spacecraft.

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