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GMIR propagation through the three-dimensional heliopshere

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Propagation is investigated of shocks caused by global merged interaction regions (GMIR) in the realistic, three-dimensional heliosphere. Our computational model is based on the multi-fluid approach, where the plasma is modeled by the set of 8 MHD equations and the transport of different populations of neutral particles is governed by separate systems of the Euler equations. The interplanetary magnetic field is specified at the inner boundary of the computational region in the form of Parker's spiral and develops in accordance with the solar wind plasma flow inside the heliosphere. The interstellar magnetic field is assumed to be orthogonal to the local interstellar medium velocity and tilted 60° to the solar ecliptic plane. This orientation of the magnetic field is considered to be a possible explanation of the 2–3 kHz emission data originating ahead of the heliopause. We analyze the global response of the heliopause to single GMIR disturbances of different duration and intensity and speculate about their possible influence on the cosmic ray modulation and radio wave emission.