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Stochastic modeling of the short-time variation of cosmic rays

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We present the stochastic simulation of the galactic cosmic ray (GCR) particles transport in the heliosphere. With this approach, we model the short-time changes of the GCR intensity at the Earth orbit. The model is grounded on the numerical solution of the set of the stochastic differential equations (SDEs) corresponding to the non-stationary Parker transport equation (PTE). We introduce the solution applying the strong order Euler-Maruyama, Milstein, and stochastic Runge-Kutta methods, and discuss its advantages and disadvantages in the context of increasing the accuracy of the solution of the PTE.

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