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Pressure balance of coronal mass ejections during their Sun-Earth journey modelled by 3D MHD EUHFORIA simulations

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2002. We use the European Heliosphere FORecasting Information Asset (EUHFORIA) model to simulate their propagation and interaction in the background solar wind. The approach is to place virtual spacecraft along the Sun–Earth line. We set up the initial conditions at 0.1 au, modelling each CME using the linear force free spheromak model. We perform an analysis on the pressures acting within the first and the last CMEs of the series (CME1 and CME3) and investigate the role of pressure (un)balance in their expansion, while the second CME (CME2) was too compressed to be able to expand its ejecta during propagation. We find that the magnetic pressure within CME1 and CME3 was prominent at 0.1 au and rapidly decreased between 0.1 au and Earth, so that the gas pressure was progressively dominating in their extended ejecta.

References : Verbeke et al 2022, ASR

The aim of this work is to understand the signatures of three coronal mass ejections (CMEs) at the Lagrange point L1 launched from the Sun between 15 and 18 July