



Advanced flux-rope CME models in EUHFORIA

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Coronal Mass Ejections (CMES) are one of the main drivers for ‘Space Weather’ which has a large socio-economic impact on Earth by interrupting or damaging our telecommunication and navigation infrastructure, causing Geomagnetically Induced Currents (GICs) in oil and gas pipelines, the electric power grid and even long bridges, etc. In order to mitigate these effects or at least lower their impact, numerical physics-based models are developed to unravel the physics behind these phenomena and predict the effects a few days in advance. To predict the impact of a CME, its so-called geo-effectiveness, it is important to take into account the internal magnetic structure of the CMEs as the sign of the magnetic field component perpendicular to the equatorial plain upon arrival at Earth is a key parameter. I will present the latest results on magnetic flux-rope models for CMEs implemented in EUHFORIA, our heliospheric wind and CME evolution model. These state-of-the-art models include the spheromak model, Fri3D (Flux-Rope in 3D), the radially contracted spheromak, and two toroidal CME models (Soloviev and Miller-Turner based models). I will also mention our novel modified Titov-Démoulin flux-rope CME model that we can launch from the low solar corona via our global MHD coronal model COCONUT.