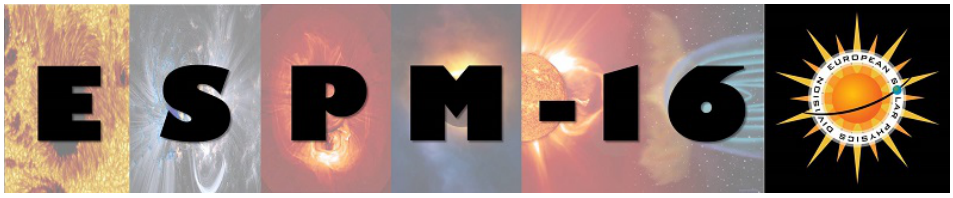

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Benchmarking and optimizing EUHFORIA2.0 coronal model for space weather

Thursday 9 September 2021 16:55 (15 minutes)

Space weather previsions require a good balance between speed and accuracy to be able to anticipate the impact of eruptive events at Earth. The strategy used by the european project EUPHORIA 2.0 is to make the best use of various numerical techniques and codes and couple them numerically. This approach however requires a very good description of the corona, as it is the first step of the chain of models that will influence every prevision. Thus it is crucial to be able to provide a coronal model that is both robust, fast and reliable to optimize the chain of previsions.

We have developed a new coronal code based on the COOLFluiD code: having an implicit scheme with adaptative CFL, this allows us to easily optimize the convergence, even for full MHD simulations. As a first step, we have used the polytropic approximation to account for the heating of the corona, before switching to more realistic source terms. We will present here the methods used to benchmark the coronal wind model, using different magnetic configurations and detailed comparisons with other coronal codes. We will then discuss the various numerical optimizations used to accelerate the computation and guarantee an accurate MHD solution within few hours of computation. Finally we will demonstrate the coupling with heliospheric codes to show its forecast abilities.

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