Evaluating the effect of wave-particle cross diffusion in radiation belts modelling using an innovative and robust numerical scheme

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The last decade has shown the prime importance of wave-particle interaction for the accurate modelling of the dynamics of energetic electrons trapped in the Earth's radiation belts, as well as for other planets, such as Jupiter or Saturn. They have been therefore added in the sum of physical processes modeled in radiation belt codes such as Salammbô, with conclusive results. However, this upgrade of the physical representation is not straightforward and comes at the price of degrading the numerical resolution. In particular, computational instabilities and odd phase space density profiles are observed, impacting the code's accuracy and its physical relevance. This challenging issue requires the development of a numerical scheme which supports in particular wave-particle cross diffusion terms. Thus, we will present in this talk the new dedicated numerical scheme we have developed and implemented in Salammbô. Then we will focus on quantifying the effect of wave-particle cross diffusion terms on the dynamics of highly energetic trapped electrons, in presenting results for real case storms.