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Solar wind interaction with Venus and Mars in a parallel hybrid code

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We discuss the development and applications of a new parallel hybrid simulation, where ions are treated as particles and electrons as a charge-neutralizing fluid, for the interaction between the solar wind and Venus and Mars. The new simulation code under construction is based on the algorithm of the sequential global planetary hybrid model developed at the Finnish Meteorological Institute (FMI) and on the Corsair parallel simulation platform also developed at the FMI. The FMI's sequential hybrid model has been used for studies of plasma interactions of several unmagnetized and weakly magnetized celestial bodies for more than a decade. Especially, the model has been used to interpret in situ particle and magnetic field observations from plasma environments of Mars, Venus and Titan. Further, Corsair is an open source MPI (Message Passing Interface) particle and mesh simulation platform, mainly aimed for simulations of diffusive shock acceleration in solar corona and interplanetary space, but which is now also being extended for global planetary hybrid simulations. In this presentation we discuss challenges and strategies of parallelizing a legacy simulation code as well as possible applications and prospects of a scalable parallel hybrid model for the solar wind interactions of Venus and Mars.