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Numerical Modeling of ICMEs and Comparison with Heliospheric Line-of-Sight Images

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Interplanetary coronal mass ejections (iCMEs) usually have complex structures as a result of their interaction with the structured solar wind and with other eruptions. Their complexity is revealed by in situ measurements and, in the past five years, through remote-sensing observations by heliospheric imagers. However, numerical modeling is often required to understand and analyse these observations because no instrument can provide a simple view of ICMEs in three dimensions. Numerical simulations can be used to determine the origin of ejecta observed near Earth or to analyze the origin, speed and extent of density structures observed remotely. In this talk, we review recent efforts to use numerical simulations of ICMEs for the analysis of line-of-sight images produced by STEREO/SECCHI to investigate the density structure, energetics and kinematics of iCMEs in interplanetary space. We also discuss how numerical simulations can be used to test different methods for the derivation of iCME properties from remote observations and to predict and explain observational effects. Finally, we show how numerical simulations are an essential tool for understanding the properties of iCMEs and for maximizing the return of heliospheric missions such as STEREO.