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Application of the particle filter to magnetospheric physics

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The particle filter can essentially be applied to any situations, even if a local linear hypothesis is not valid or the dimension of a state vector is extremely large. Although this technique requires large computer resources, this problem is being overcome by the recent development of computer technology. In this study, we developed a method to assimilate energetic neutral atom (ENA) data remotely observed by the IMAGE satellite into a physical model of the inner magnetosphere. The dimension of the observation vector in this case is 900, and the dimension of the state vector in the inner-magnetospheric model is more than 2 000 000. In order to test the method, we tried to assimilate a test data generated by a test simulation into another rather simple model, and we confirmed that this method produced a reasonable result.