



A system identification approach to modelling waves in the inner magnetosphere

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The system identification approach based on nonlinear autoregressive moving average exogenous (NARMAX) models is used to develop models of the spatiotemporal evolution of waves in the inner magnetosphere. These data based models use input-output data to train a model that can be used for forecasting the waves. Here, the output data are the wave intensities measured by spacecraft such as the Van Allen Probes, while the inputs are time lags of the solar wind and geomagnetic indices, along with the location of the spacecraft in L-shell, magnetic local time and magnetic latitude at the time of measurement. The final NARMAX models are then used to plot the evolution of the waves over the whole inner magnetosphere and are compared to the track of the Van Allen Probes.