

# Data-adaptive harmonic analysis and stochastic modeling of solar wind-magnetosphere coupling

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The solar wind-magnetosphere coupling is studied by recently developed data-adaptive harmonic decomposition (DAHD) and stochastic Multilayer Stuart-Landau Modeling (MSLM) techniques. DAHD identifies frequency-based modes of interactions in the combined dataset of Auroral Electrojet (AE) index and the proxy of solar wind forcing. The time evolution of these modes can be very efficiently simulated by systems of stochastic differential equations (SDEs) that are stacked per frequency and formed by coupled Stuart-Landau oscillators. These SDEs capture the modes' frequencies as well as their amplitude modulations, and yield, in turn, an accurate modeling of the AE index' statistical properties. The presented approach could be helpful to identify and separate internal magnetospheric variability from the one caused by external solar forcing.

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.Kondrashov, D., and M. D. Chekroun, 2018: Data-adaptive harmonic analysis and modeling of solar wind-magnetosphere coupling, *Journal of Atmospheric and Solar-Terrestrial Physics*, in press, doi:10.1016/j.jastp.2017.12.021.

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