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14.48 Modal analysis of magnetic probe array data with method of Stochastic Subspace Identification in the J-TEXT tokamak

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In J-TEXT plasma, multiple modes often occur simultaneously, such tearing m/n=2/1 (or 3/1, 5/2) mode, BAE, and even response to Resonant Magnetic Perturbatoins (RMPs), producing complex mixed signal data of magnetic probe array and leading to problems during analysis of modal evolution. Stochastic Subspace Identification (SSI), as method of decomposing multi-mode signals, is applied on J-TEXT tokamak. Tens of chord signals of magnetic probe array on the same poloidal location have been acquired with the sampling frequency of 250/500 kHz. By analysis of magnetic signals with SSI method in this work, three cases of multi-mode analysis are processed: 1) signals of multiple tearing 2/1 and 5/2 (or another) modes are distinguished into different frequencies and spatial shape on poloidal position, 2) the frequency and spatial shape of very modest Beta-induced Alfvén Eigenmodes (BAEs) observed by magnetic probe array are extracted successfully, 3) plasma response to rotating RMPs can be identified in comparison from tearing 2/1 mode.

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