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Alfven wave tomography for plasma in a sphere[1] ROBERT SILLER, IVAN KHALZOV, CARY FOREST, Center for Magnetic Self-Organization, University of Wisconsin, Madison, MPDX TEAM — We present a diagnostic technique to study the properties of plasma in a spherical vessel based on analysis of Alfven spectra – Alfven wave tomography. The technique is closely related to the helioseismic inversion, but instead of acoustic waves the Alfven waves are used, Alfven waves in plasma are assumed to be excited in the presence of an external axial magnetic field. The Alfven mode frequencies depend on the distribution of plasma parameters, inverting this dependence for a given (experimentally measured) set of Alfven modes, we are able to infer the spatial structure of plasma characteristics. We demonstrate this inversion technique by determining the differential plasma rotation from the splitting of the low-frequency Alfven modes. The developed diagnostic will be used for reconstruction of plasma equilibrium states with flows in the Madison Plasma Dynamo Experiment (MPDX). This is an important step towards realizing the plasma dynamos for the first time in the laboratory.

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Robert Siller
Center for Magnetic Self-Organization, University of Wisconsin, Madison

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