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MHD Mode Identification by Higher Order Singular Value Decomposition of C-2W Mirnov Probe Data MATTHEW TOBIN, THOMAS ROCHE, TADAFUMI MATSUMOTO, THE TAE TEAM, TAE Technologies, Inc. — The C-2W device (also known as 'Norman') at TAE Technologies has proven successful at generating stable, long-lived field-reversed configuration plasmas (FRCs) with record temperatures [1]. Detection of magnetohydrodynamic (MHD) mode structures in these plasmas is crucial to understanding plasma instability and the conditions that give rise to it. When they do appear, MHD mode structures cause fluctuations in the magnetic field within and around the plasma, which can be detected by magnetic field sensors such as Mirnov probes. The largest Mirnov probe array in C-2W comprises 64 probes and is roughly evenly spaced in two dimensions [2], creating a unique opportunity to apply higher order singular value decomposition (HOSVD) [3] to efficiently analyze the external magnetic field data these probes record to reconstruct MHD mode structures in the FRC. This method is shown to quickly and effectively detect toroidal modes while indicating longitudinal dependence of mode phases, enhancing the coherence and utility of the vast quantity of data this array produces. [1] H. Gota et al., Nucl. Fusion, 59, 112009 (2019) [2] T. Roche et al., Rev. Sci. Inst., 89, 10J107 (2018) [3] L. De Lathauwer et al., SIAM J. Matrix Anal. Appl. 21, 1253-1278 (2000)

Matthew Tobin
TAE Technologies, Inc.

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