Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

Basis function bispectral analysis in a cylindrical coordinate system D.A. BAVER, P.W. TERRY, University of Wisconsin-Madison, G.R. TYNAN, S.H. MUELLER, University of California-San Diego — Bispectral analysis is a class of algorithms for inferring turbulence parameters using measured data to fit to a generic model equation. However, the model equations used in previous bispectral algorithms do not account for the geometry of actual plasma experiments. This can potentially produce spurious results, so an algorithm tailored to the geometry of a specific experiment is desirable. We present an algorithm adapted to the cylindrical coordinate system found in experiments such as CSDX. This algorithm uses an incomplete basis approximation for both linear and nonlinear terms. This approach is chosen because the linear eigenmodes cannot be known a priori since mode width depends on flow shear; the resulting coupling between assumed eigenmodes requires the calculation of an interaction matrix, which greatly increases data requirements. Applying a smoothness assumption reduces data requirements to acceptable levels, allowing the algorithm to operate on limited data sets. We will demonstrate tests of this algorithm on simulation data, and we will also apply the algorithm to experimental data from CSDX. Varying the model equations permits solutions for both single field and multiple field data, which can be compared to determine the importance of multifield effects. Work supported by USDOE.

Derek Baver
University of Wisconsin-Madison

Date submitted: 22 Jul 2007 Electronic form version 1.4