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Coherent vortex extraction using proper orthogonal decomposition and wavelets methods. S. FUTATANI, Universite de Provence, Marseille, W.J.T. BOS, Ecole Central de Lyon, D. DEL-CASTILLO-NEGRETE, Oak Ridge National Laboratory, K. SCHNEIDER, S. BENKADDA, Universite de Provence, Marseille, M. FARGE, Ecole Normale Superieur — The Proper Orthogonal Decomposition (POD), also known as Karhunen-Loeve expansion, and the wavelet decomposition are two useful techniques to extract coherent structures from data sets. In this work we present a comparative study of the application of both techniques to plasma turbulence. We focus on two-dimensional resistive drift-wave turbulence described by the Hasegawa-Wakatani model. This relatively simple model contains key elements for the study of turbulence including the possibility of cross-field transport and the spontaneous formation of coherent structures. In the POD context, the extraction of the coherent structures is based on low-order truncations of the singular value decomposition of the data sets. The wavelet method is based on the thresholding of the wavelet coefficients. The data is decomposed into an orthogonal wavelet series, a thresholding is applied and the coherent vortices are reconstructed from few strong coefficients. Both approaches are compared in terms of compression rate, retained energy, and enstrophy level of the coherent vortices.

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