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Educing properties of wave-like structures from the spatial wavenumber spectrum DANIEL EDGINGTON-MITCHELL, PETRONIO NOGUEIRA, Monash Univ, VINCENT JAUNET, ENSMA, KILIAN OBERLEITHNER, Technical University of Berlin, PETER JORDAN, CNRS, ANDRE CAVALIERI, ITA, AARON TOWNE, University of Michigan — Abstract: In this work we present a method for estimating the properties of wave-like coherent structures in turbulent flows. There is increasing recognition that many flows are characterized by multiple mutually coherent wave-like structures at the same frequency, as recently identified in compressible subsonic jets (Towne et al., 2017) and supersonic jets undergoing resonance (Edgington-Mitchell, 2019). Existing techniques such as SPOD (Towne et al., 2018) can separate components with either differing phase or frequency, but an additional step is needed to educe the properties of multiple coherent structures at the same frequency. Here we present an empirical method to educe wave properties via peak fitting in the spatial wavenumber domain. Various functional forms capable of describing waves that are growing and decaying within the domain are developed. The analytical Fourier transforms of these functions are used to fit the spectral peaks by taking a spatial Fourier transform of the flow data. The performance of the technique is demonstrated on both synthetic and real data, and limitations discussed. Acknowledgements: This work was supported by the Australian Research Council through the Discovery Project scheme.

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