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On the relevance of uncorrelated sequencies of Lorenzian pulses for the interpretation of turbulent fluctuation data at the edge of magnetically confined toroidal plasmas RAUL SANCHEZ, Universidad Carlos III de Madrid, Spain, BOWDEWIJN VAN MILLIGEN, CARLOS HIDALGO, Asociación EURATOM-CIEMAT, Spain — Recently, it has been proposed that the turbulent fluctuations measured in a linear plasma device could be described as a superposition of uncorrelated Lorentzian pulses with a narrow distribution of durations, which would provide an explanation for the reported quasi-exponential power spectra. Here, we study the applicability of this proposal to edge fluctuations in toroidal magnetic confinement fusion plasmas. For the purpose of this analysis, we introduce a novel wavelet-based pulse detection technique that offers important advantages over existing techniques. It allows extracting the properties of individual pulses from the experimental time series, and quantifying the distribution of pulse duration and energy, as well as temporal correlations. We apply the wavelet technique to edge turbulent fluctuation data from the W7-AS stellarator and the JET tokamak, and find that the pulses detected in the data do not have a narrow distribution of durations and are not uncorrelated. Instead, the distributions are of the power law type, exhibiting temporal correlations over scales much longer than the typical pulse duration. These results cast doubt on the proposed ubiquity of exponential power spectra in this context.

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