

Time-frequency analysis for microwave reflectometry data processing in the HL-2A tokamak

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The Choi-Williams distribution (CWD) technique is introduced as a time-frequency tool for processing data measured from the new developed homodyne and the fixed frequency reflectometry in the HL-2A tokamak. The comparison between spectrogram and CWD for the simulated signal is presented. It indicates that the CWD can greatly improve the representation of the time-frequency content of the multi-components signal. Its effectiveness is demonstrated through two applications in HL-2A, which are the extraction of beat frequencies from the frequency modulated-continuous wave reflectometry (FM-CW) and the characterizing of the fluctuations. The density profile inversed from the group delay of the FM-CW and the density fluctuations deduced from the fixed-frequency reflectometry would be more reliable and accurate by using the CWD technique. © 2011 American Institute of Physics. [doi:[10.1063/1.3657157](https://doi.org/10.1063/1.3657157)]