Intervals of Freedom for Wavelet Sets

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A a measurable subset W of $\mathbb{R}$ is a wavelet set if $\mathbb{R}$ is the disjoint union $\cup_{n\in\mathbb{Z}}(W + 2\pi n)$ and the disjoint union $\cup_{n\in\mathbb{N}} 2^n W$ (up to a sets of measure zero). These sets arise because they are the Fourier transform of simple wavelets and are thus useful in the study of more general wavelets. An interval of freedom is an interval $I \subseteq \mathbb{R}$ such that for any measurable subset $A \subseteq I$ there is a wavelet set W so that $W \cap I = A$. These are useful in generating different wavelet sets. We shall discuss necessary and sufficient conditions we have determined for an interval to be an interval of freedom.