Generalised Wave-front Sets of Global Type

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Abstract: We introduce global wave-front sets $\mathrm{WF}_{\mathcal{B}}(f)$, $f \in \mathscr{S}'(\mathbf{R}^d)$, with respect to suitable Banach or Fréchet spaces $\mathcal{B}$. An important special case is given by the modulation spaces $\mathcal{B} = M(\omega, \mathscr{B})$, where ω is an appropriate weight function and $\mathscr{B}$ is a translation invariant Banach function space. We show that the standard properties for known notions of wave-front set extend to $\mathrm{WF}_{\mathcal{B}}(f)$. In particular, we prove that microlocality and microellipticity hold for a class of globally defined pseudo-differential operators $\mathrm{Op}_t(a)$, acting continuously on the involved spaces.