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Super-singular perturbations in the scale of Hilbert spaces

The classification of bounded from below super-singular perturbations $\tilde{A}$ of a self-adjoint operator $A \geq 1$ is proposed. In the A-scale of Hilbert spaces $\mathcal{H}_{-k} \supset \mathcal{H} \supset \mathcal{H}_k = \mathrm{Dom} A^{k/2}$, $k > 0$ the parametrization of operators $\tilde{A}$ in the terms of bounded mappings $S : \mathcal{H}_k \to \mathcal{H}_{-k}$ such that $\mathrm{Ker} S$ is dense in $\mathcal{H}_{k/2}$ is obtained.

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