

Complex interpolation between first order power-weighted Sobolev spaces defined on the halfline

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Let us consider $p \in (1, \infty)$, $\beta \in \mathbb{R}$ and the real-valued power weighted Sobolev spaces $W^{1,p}(\mathbb{R}_+, t^\beta)$, and $W_0^{1,p}(\mathbb{R}_+, t^\beta)$ (the completion of $C_0^\infty(\mathbb{R}_+)$ in $W^{1,p}(\mathbb{R}_+, t^\beta)$). Denote by $W^{1,p}(\mathbb{R}_+, t^\beta)(\mathbb{C})$ and $W_0^{1,p}(\mathbb{R}_+, t^\beta)(\mathbb{C})$ the complex-valued Sobolev spaces $W^{1,p}(\mathbb{R}_+, t^\beta) \oplus iW^{1,p}(\mathbb{R}_+, t^\beta)$ and $W_0^{1,p}(\mathbb{R}_+, t^\beta) \oplus iW_0^{1,p}(\mathbb{R}_+, t^\beta)$, respectively.

Applying density results from paper [1], for the considered Sobolev spaces $W^{1,p}(\mathbb{R}_+, t^\beta)(\mathbb{C})$ and $W_0^{1,p}(\mathbb{R}_+, t^\beta)(\mathbb{C})$, it was possible to obtain the characterization of complex interpolation spaces in the setting of the respective power weighted Sobolev spaces, for all $\beta \in \mathbb{R}$. We will connect them with the known results about complex interpolation between Sobolev spaces and formulate some open problems.

REFERENCES

- [1] Radosław Kaczmarek, Agnieszka Kałamajska, "Density results and trace operator in weighted Sobolev spaces defined on the half-line, equipped with power weights", *Journal of Approximation Theory* **291**(2023) Art. No. 105896, <https://doi.org/10.1016/j.jat.2023.105896>