

REGULARIZATION OF ROUGH LINEAR FUNCTIONALS AND ADAPTIVITY

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ABSTRACT

Rough linear functionals, such as Dirac Delta distributions, often appear on the right-hand side of variational formulations of PDEs. As they live in negative Sobolev spaces, they dramatically affect adaptive finite element procedures to approximate the solution of a given PDE. To overcome this drawback, we propose an alternative that, in a first step, computes a projection of the rough functional over piecewise polynomial spaces, up to a desired precision in a negative norm sense. The projection, being L^p -regular, is then used as the right-hand side of a regularized problem for which adaptive Galerkin methods performs better. An error analysis of the proposed methodology will be shown, together with numerical experiments.

REFERENCES

- [1] Millar, F., Muga, I., Rojas, S. and Van der Zee, K., *Projection in negative norms and the regularization of rough linear functionals*. Numer. Math. 150, 1087–1121 (2022)

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