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# Anisotropic adaptive finite elements for aluminium electrolysis

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Our work is mainly concerned in the simulation of aluminium electrolysis, which is a complex task involving multi-scale features. In order to obtain a tradeoff between computational accuracy and efficiency, adaptive finite elements with large aspect ratio are considered. Simulations of aluminium electrolysis in a complex domain will be presented.

For a theoretical study of our strategy two models problems will be considered, the linear elliptic equation $-\nabla \cdot (\mu \nabla u) = f$, where $\mu > 0$ varies strongly but smoothly and the nonlinear problem $-\nabla \cdot (\mu + |\nabla u|)\nabla u = f$, where $\mu$ is a positive constant.

The anisotropic setting of [2, 3] will be used, the linear problem being an extension of [5], the nonlinear problem being an extension of [1, 4].

A numerical study of the effectivity index will be presented for both problems, on non-adapted and adapted meshes.

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