Maximum-norm error analysis of a non-monotone FEM for a singularly perturbed reaction-diffusion problem in 1D

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We consider a non-monotone FEM discretization of a singularly perturbed one-dimensional reaction-diffusion problem whos solution exhibits strong layers. The method is shown to be maximum-norm stable although it is not inverse monotone. Both a priori and a posteriori error bounds in the maximum norm are derived. The a priori result allows to deduce immediately the uniform convergence of various layer-adapted meshes proposed in the literature, while the a posteriori results may be used for adaptive regridding. Numerical experiments complement our theoretical results.

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