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Numerical approximation of singularly perturbed reaction-diffusion problems with the virtual element method

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SUMMARY

In this work, singularly perturbed problems of reaction-diffusion type are approximated using the virtual element method [1, 2]. To avoid the propagation of spurious oscillations, the virtual element method is stabilized by means of the link-cutting strategy [3, 4]. It consists in modifying the mesh near the boundary where the solutions exhibits layers. In addition, we will obtain accurate approximations to the solution in the layer regions using a postprocessing technique. In the layer regions the solution is defined on a mesh of Shishkin type which is aligned with the boundary of the domain. Numerical examples are shown to illustrate the methodology.

Keywords: Virtual element method, singularly perturbed problems, link-cutting condition

AMS Classification: 65L11,65M60

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