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Model problem of singular perturbation without limit in the space of finite energy and its computation. (English. Abridged French version) [\[Zbl 0932.35064\]](#)

C. R. Acad. Sci., Paris, Sér. II, Fasc. b, Méc. Phys. Astron. 327, No. 5, 485-492 (1999).

Summary: We consider elliptic problems of singular perturbation which depend on a small parameter ε , the right-hand side f belonging to the dual of the energy space for $\varepsilon > 0$. For $\varepsilon = 0$, f belongs neither to the energy space nor to the admissible spaces of Lions and Magenes, taking into account the behaviour at the boundary. We exhibit boundary layer phenomena with large intensity. These boundary layers determine $u^0(x, \varepsilon)$ (the leading term) which explodes at an order of ε depending on f . Numerical computations are faithful only with a very thin mesh in the boundary layers. We also give some results concerning the case when f can be treated within the framework of Lions and Magenes theory for the limit problem.

MSC:

35J30 Higher-order elliptic equations

35B25 Singular perturbations in context of PDEs

65L10 Numerical solution of boundary value problems involving ordinary differential equations

Cited in **1** Review
Cited in **3** Documents

Keywords:

numerical computation; boundary layer; finite elements; singular perturbation

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