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Limit layers in the study of the asymptotic behavior of thin structures

This is joint work with J. Couce-Calvo, M. Luna-Laynez, J.D. Martín-Gómez and F. Murat.

We consider the problem of the asymptotic behavior of partial differential problems posed in structures whose size ε , in a (or several) directions is very small (bars, plates,...). For these problems, it is usual to search for an asymptotic expansion of the solutions in powers of ε . But, usually only the first term of this expansion satisfies the boundary conditions. Thus, in order to obtain an approximation of the solutions of higher order, it is necessary to add some boundary layers terms to the asymptotic expansion. We show how these terms can be found for diffusion problems in several cases such as Dirichlet and Neumann conditions, junctions,... We also give some partial results in elasticity.