Numerical analysis and thin layers

Eugene O'Riordan

SUMMARY

Boundary value problems involving singularly perturbed partial differential equations arise in several branches of applied mathematics. The analytical solutions to these problems typically exhibit steep gradients in narrow regions of the domain. The presence of these gradients can have an adverse effect on the performance of classical numerical methods. Some of these shortcomings will be highlighted to demonstrate that alternative perspectives are required when dealing with multi-scale problems. Some of the approaches to designing layer-adapted numerical methods will be introduced and their potential advantages (over a classical approach) will be discussed.

[1]School of Mathematical Sciences
 Dublin City University
 email: `eugene.oriordan@dcu.ie`