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Gerard Awanou*, Department of Mathematical Sciences, Northern Illinois University, DeKalb, IL 60115. *Robustness of the Multivariate Spline Method for numerical solution of partial differential equations*. Preliminary report.

Multivariate spline functions are smooth piecewise polynomial functions over triangulations consisting of n -simplices in the Euclidean space \mathbb{R}^n . We review how they are used with Lagrange multipliers to enforce the smoothness conditions, the boundary conditions and the constraints in numerical solution of partial differential equations. We then demonstrate the robustness of this approach on two singular perturbation problems, a fourth order problem and a Stokes-Darcy flow. (Received September 16, 2006)