A POSTERIORI ERROR ESTIMATION FOR PROBLEMS IN DIMENSIONAL REDUCTION

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Dimensional reduction is commonly used to simplify problems posed on thin three-dimensional domains to more manageable two-dimensional problems. The resulting modeling error is either assumed to be negligible or measured in in the energy norm, e.g., [1-3]. We present an approach to the *local* estimation of errors in dimensionally reduced models of elliptic boundary value problems posed on thin domains. In this approach, errors are measured in quantities of interest whose computation is typically the goal of the analysis. Explicit bounds and estimates are derived for errors in quantities of interest that can be characterized by continuous linear functionals.

Applications of our approach to problems posed on thin flat plates, circular arches and spherical shells will be presented. Numerical experiments show that the bounds are accurate over a wide range of thicknesses.

References

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