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# AN ERROR ESTIMATOR FOR CONVECTION-DIFFUSION EQUATIONS

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## **An Error Estimator for Convection-Diffusion Equations**

### **Synopsis:**

Adaptive algorithms, based on error estimators, are designed to improve the accuracy of the numerical solution of some partial differential equations while limiting the unavoidable resulting increase in the computational complexity to realistic levels. An A Posteriori error estimator for convection diffusion equations, with mathematical analysis and computer implementation, is presented.

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Finite Element Methods are effective procedures to compute the numerical solution to partial differential equations arising from the modeling of physical problems.

However, for problems with local singularities, e.g., singularities near a re-entrant corners, boundary layers, or shocks, one observes a serious deterioration of the overall accuracy of the numerical solution.

Adaptive algorithms are designed to improve the accuracy of that solution, while limiting at the same time the unavoidable resulting increase in complexity to realistic levels that can still be handled by today's computers.

A key ingredient to such algorithms is a tool (error estimate) providing some information on the local (and global) quality of the computed solution.

In this paper, we present an A Posteriori error estimator for the convection dominated convection-diffusion equations, along with mathematical analysis and results from computer implementation.