Department of Mathematical Sciences
Colloquium

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Finite Element Analysis of a Convection-Diffusion Equation

When a solid object interacts with a flowing medium (such as, e.g., water or air), the molecules of the fluid change their velocity very rapidly within a thin film adjacent to the object's surface. This film is called *boundary layer*. Due to the extremely small width of boundary layers, their numerical approximation is challenging. In particular, due to the hyperbolic nature of the equations of fluid dynamics, numerical errors committed in the boundary layer are transported quickly into the rest of the computational domain, and they may spoil the results of the computation completely. Therefore, accurate and efficient approximation of flows in boundary layers is a topic of paramount importance in aerospace, air force, and naval research.
In this work we analyze a model linear convection-diffusion equation which exhibits a boundary layer, and study the optimality of meshes for its finite element approximation. So far, the best meshes available are the *Shishkin* and *Bakhvalov* meshes. We construct a new class of meshes which are based on the equidistribution of the piecewise-linear interpolation error in the finite elements. Numerical results show that such meshes have better approximation properties than both the Shishkin and Bakhvalov meshes.

Friday, October 27, 2006 at 3 pm at Bell Hall 143
The University of Texas at El Paso

Refreshments will be served in front of the colloquium room, 15 minutes before the start of the colloquium.

For further information, please contact Dr. Pavel Šolín, Bell Hall 220. Phone: (915) 747- 6770, email: solin@utep.edu.