1052-35-7 **Kevin R. Payne*** (`kevin.payne@unimi.it`), Dipartimento di Matematica, Universita' di Milano, Via Saldini, 50, 20133 Milano, Italy. *PDE of mixed type: The twin challenges of globalization and diversity.*

Partial Differential Equations (PDE) of mixed elliptic-hyperbolic type arise in particular but interesting contexts such as transonic fluid flow and isometric embeddings of Riemannian manifolds whose curvature changes sign. Such problems are difficult due in large measure to diversity; that is, the mixture of qualitative types competes with the fact that sharp PDE tools are often calibrated to the type of the equation.

The most interesting problems involve nonlinear equations, but progress on them remains inhibited due to a glaring lack of precise information on linear equations of mixed type. For example, even for linear equations, the question of what constitutes a well posed boundary value problem is particularly delicate as the desired regularity of solutions is crucial. For truly nonlinear problems, handling possible singularities or shocks is a main objective.

One often can reduce the question at hand to the presence of suitable a priori estimates. For mixed type equations, such estimates, even when locally available, need not be globalizable in a robust or clear-cut way. We will give a general overview of some of the interesting problems which involve mixed type PDE as well as some strategies for obtaining global information. (Received August 31, 2009)