1030-35-39 **Laura Valentina Spinolo*** (spinolo@math.northwestern.edu), Department of Mathematics, Northwestern University, 2033 Sheridan Road, Evanston, IL 60208-2370, and **Stefano Bianchini**.
Perturbation techniques applied to the parabolic approximation of a boundary Riemann problem.

The talk will deal with a singular O.D.E. in the form

$$u' = \frac{1}{\delta(u)}\phi^s(u) + \phi^n(u), \quad u,\ \phi^s,\ \phi^n \in \mathbb{R}^m,\ \delta \in \mathbb{R},$$

where δ, ϕ^s and ϕ^n are regular functions and δ can attain the value 0.

It will be shown how the study of such an O.D.E. arises from the analysis of the parabolic approximation of an hyperbolic initial boundary value problem with constant Cauchy and Dirichlet data. Indeed, in several physically relevant examples the viscosity matrix is not invertible. If this is the case, travelling waves and boundary layer profiles may be described by a singular O.D.E. and hence might a priori present pathological behaviours.

It will be also discussed how the analysis of the singular O.D.E. allows to define a condition which indeed prevents the arising of pathological behaviours. Such a condition is satisfied by physically meaningful examples, e.g. the Navier Stokes equation written in Eulerian coordinates. (Received June 28, 2007)