MS5: Nonlinear PDEs of Conservation Laws and Fluid Mechanics I

Asymptotic Expansion of Hyperbolic Evolution Operators

Robin Young, *University of Massachusetts*

We describe perturbation results for hyperbolic evolution equations: if the data admits an expansion in powers of ϵ, then so does the solution. This problem is part of our long-standing program (with Blake Temple) to construct periodic solutions of Euler. By differentiating the evolution operator, we derive a Taylor expansion, valid before blowup of the solution. This method loses derivatives, so we study the exact linearization around an arbitrary solution via a Neumann series.

Periodic Solutions to Sign-Changing Liouville Equations

Ralph Saxton, *University of New Orleans*

We consider periodic solutions to an initial boundary value problem for a Liouville equation with sign-changing weight. A representation formula exists which admits classes of singular and nonsingular boundary data and predicts that solutions may blow up. In the case of singular boundary data we study the effects the induced singularity has on the interior regularity of solutions. Regularity criteria are also found for a generalized form of the equation. (Work with A. Sarria).

Some Recent Results for Hyperbolic Balance Laws

Yanni Zeng, *University of Alabama at Birmingham*

In this talk we discuss some recent results for a general system of hyperbolic balance laws. We consider the Cauchy problem near an equilibrium state. Under a set of assumptions, which include an entropy function and the Shizuta-Kawashima dissipation condition, we obtain the existence of global solution and large time behavior. We also discuss the consequence of the removal of the Shizuta-Kawashima condition, as happens in the dynamics of real gasses.

Wellposedness of Variational Wave Equation

Geng Chen, *Georgia Institute of Technology*

In this talk, we discuss the well-posedness of variational wave equations.