The Role of Characteristics in Conservation Laws

Abstract

“Conservation laws” is the name given to a class of partial differential equations—quasilinear hyperbolic PDE, to be specific. These equations share the properties that on the one hand they are used to model many important processes in physics and engineering, and on the other hand they are very difficult to study. At the present time, there is no mathematical theory for conservation laws in more than one space dimension, and even in a single space dimension, general results are known only when the initial data are close to a constant. An appealing entry point into the theory is through the notion of characteristics, which govern many of the qualitative features of solutions and explain some of the paradoxes of their mathematical behavior. This talk will focus on ways that characteristics in systems of conservation laws give information about the systems being modeled.