1038-35-201 **Gui-Qiang Chen**, Department of Mathematics, Northwestern University, Evanston, IL , and **Mikhail Feldman*** (feldman@math.wisc.edu), Department of Mathematics, University of Wisconsin-Madison, Madison, WI 53706. *Shock Reflection, Transonic Flow, and Free Boundary Problems (Part II).*

When a plane shock hits a wedge head on, it experiences a reflection-diffraction process and then a self-similar reflected shock moves outward as the original shock moves forward in time. The complexity of reflection configurations was first reported by Ernst Mach in 1878, and experimental, computational, and asymptotic analysis has shown that various patterns of shock reflection may occur, including regular and Mach reflection. However, most fundamental issues for shock reflection have not been understood, including the transition of the different patterns of shock reflection. Therefore, it becomes essential to establish a mathematical theory on the existence, stability, and regularity of global configurations of shock reflection, especially for potential flow which has widely been used in aerodynamics.

In Part II, we will present some recent results in attacking the shock reflection problems, including the existence, stability, and regularity of global configurations of regular shock reflection by wedges for potential flow. The approach includes techniques to handle free boundary problems and degenerate elliptic equations. (Received February 10, 2008)