Chapter 6

Applications

In this Chapter we give the applications of our general theory to some physical systems and a system related to geometric problems. These systems include the quasilinear canonical system related to the Monge-Ampère equation, the system of nonlinear three-wave interaction in plasma physics, the nonlinear wave equation with higher order dissipation, the system of one-dimensional gas dynamics with higher order damping, the system of motion of an elastic string, the system of plane elastic waves for hyperelastic materials and the nonlinear wave equation with scalar operators of higher order. For these systems, we give a complete result on the global existence or the blow-up phenomenon, particularly, the life span of the C^1 solutions to their Cauchy problems.

§6.1.   Quasilinear canonical system related to the Monge-Ampère equation

We consider the following quasilinear canonical system

$$\sum_{j=1}^{n} a_{ij}(u) \frac{\partial u_j}{\partial \alpha} = 0 \quad (i = 1, \cdots, m), \tag{6.1.1}$$