

**DARIO BAMBUSI**  
University of Milan

*Birkhoff normal form for some quasilinear Hamiltonian PDEs*

Consider a Hamiltonian PDE having an elliptic equilibrium at zero. Assuming a suitable conditions on the eigenvalues of the linearized problem (frequencies of small oscillation) we will construct a canonical transformation putting the system in Birkhoff normal form up to a small remainder.

In the nonresonant semilinear case one can deduce that solutions corresponding to small initial data remain close to approximatively invariant tori for long times. A similar conclusion can be obtained also in the quasilinear case provided some assumptions on the Lyapunov exponents of the system are added.

The general theory will be applied to a quasilinear wave equations in an  $n$  dimensional paralleliped and to the equations of the water wave problem.

An extension of the result to some systems with continuous spectrum will be discussed; as an application it will be shown that the nonlinear Schrödinger equation appears as a resonant normal form for the nonlinear Klein–Gordon equation.

Some open problems will be discussed.