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Penalization methods for quasi-linear variational problems and applications to Hamiltonian systems

(joint work with Laurent Landry)

Abstract

Various variational methods have been developed for semi-linear differential equations. However many applications are rather quasi-linear, in which case these methods fail.

In the variational approach to stationary surface water waves, penalization methods have been used with some success to deal with the full quasi-linear physical problem, giving also information on the orbital stability of solitary waves.

Penalization methods lead to multiplicity results of homoclinic orbits in conservative Lagrangian systems. The potential is allowed to depend on both position and velocity, and therefore the Lagrangian is not convex with respect to velocity.