

# Asymptotic Behavior of systems of PDE arising in physics and biology: theoretical and numerical points of view (ABPDE II)

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## Global existence for small data of the viscous Green-Naghdi equations

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We consider the Cauchy problem for the Green-Naghdi equations with viscosity, for small initial data. It is well-known that adding a second order dissipative term to a hyperbolic system leads to the existence of global smooth solutions, once the hyperbolic system is symmetrizable and the so-called Kawashima-Shizuta condition is satisfied. We first show that the Green-Naghdi equations can be written in a symmetric form, using the associated Hamiltonian. This system being dispersive, in the sense that it involves third order derivatives, the symmetric form is based on symmetric differential operators. Then, we use this structure for an appropriate change of variable to prove that adding viscosity effects through a second order term leads to global existence of smooth solutions, for small data. We also deduce that constant solutions are asymptotically stable.

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