Hamiltonian approach to field dynamics

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Abstract

Using examples of: 1) scalar field theory, 2) electrodynamics, 3)Pauli-Fierz theory, I will show how the Hamiltonian description of field dynamics enables us to find appropriate mathematical tools for the analysis of the dynamics stability. I very much hope that similar methods can be used in General Relativity Theory, where proving stability is extremely difficult. The reason for this difficulty is that any attempt (there have been many of them!) to define a positive and conserved gravitational field energy leads to serious problems. I will try to explain these difficulties and to formulate my hopes.