Quaternionic quantum wave and the Klein-Gordon equations in Cauchy-Navier elastic solid

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Abstract

We show that a quaternionic quantum fild theory can be rigorously derived from the classical balance equations in isotropic crystal, where the energy and momentum transport are described by the Cauchy-Navier equations. We find a mathematical quaternionic formula for coupling between compression and torsion of the diplacement. The formula allows for a spatially localized wave function that is equivalent to the particle. A quantum wave equation that generates the Klein-Gordon equation is derived. We show the self-consistent classical interpretation of wave phenomena.

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