

From Navier–Cauchy to diffusion equation using quaternion algebra

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Upon combining the properties of ideal elastic crystal, the Navier–Cauchy equations and the quaternion algebra we propose a new approach that is likely to provide new possibilities to describe real systems. Mass and energy densities within relativistic limit are produced and the Klein–Gordon equation derived. The extremum principle allows the rigorous derivation of the diffusion equation. By the energy minimization combined with normalization condition, we produce the quaternion analog of the time-independent Schrödinger equation. Time evolution equation is proposed in quaternion form as an analog for the complex time-dependent Schrödinger equation. The present approach allows for resolving some problems and paradoxes that emerge through conventional interpretations. Quaternion algebra simplifies physical reality.