

Hardness of a Crystal Lattice as Consequence of Quantum “Freezing” of Atomic Degrees of Freedom

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It has been shown that in the classical computer model the “matter of a crystal” has the kinetic and mechanical properties of a dense gas or a simple liquid at any temperature, including the area near the absolute zero. Agreement with the experiment and a stable hard crystal structure with high enough real activation energy (for instance $E \approx 40RT_m$) can be obtained if quantum effects and especially quantum “freezing” of atomic degrees of freedom are introduced in the model.

Key words: Quantum “Freezing”; Lattice Stability; Solidification; Atomic Quantum Effects; Computer Simulation.