

An Ontological Basis for the Diffusion Theory

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A question of interpretation of diffusion is answered in the affirmative. Fick's diffusion equation represents physical reality that has been interpreted by Einstein and Smoluchowski. This gives rise to new question, how broad is spectrum of physical reality that diffusion could in principle give a complete account. Here we will base on the elegant mathematical foundations formulated three decades before Fick by French mathematician Augustin Cauchy (~1822). It will be shown that the diffusion equation follows from his model of the ideal elastic continuum, namely the classical energy and momentum balance equations and is the consequence of the stable wave existence.

This demonstrates that the complete ontological construal of diffusion theory exists. Explicitly, the interpretation of the diffusion equation and of the flux constative formulae. The two terms in the flux equations; the driving forces defined by the potential gradients and the kinetic coefficients in front of the driving forces are discussed in this paper. The fundamental consequences of all derived equations and relations for physics, chemistry and the future prospects are presented.