Superfluid Hydrodynamic in Fractal Dimension Space

D.A. Tayurskii and Yu.V. Lysogorskiy

Institute of Physics, Kazan Federal University, Kazan, Russia

The complex behavior of quantum fluids like liquid ^{4}He and liquid ^{3}He in nanoporous media is determined by the influence of randomly distributed geometrical confinement described by means of a fractal geometry. The thermodynamic limit conditions are violated in a fractal dimension space so all thermodynamic functions become the non-extensive ones and this non-extensivity property should be incorporated into any theoretical model for superfluids[1]. In the present paper the Fractional Schrodinger equation[2] has been used to derive two-fluid hydrodynamical equations for describing the motion of superfluid helium in the fractal dimension space. Nonlinear equations for oscillations of pressure and temperature are obtained and a coupling between pressure and temperature oscillations is predicted.

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