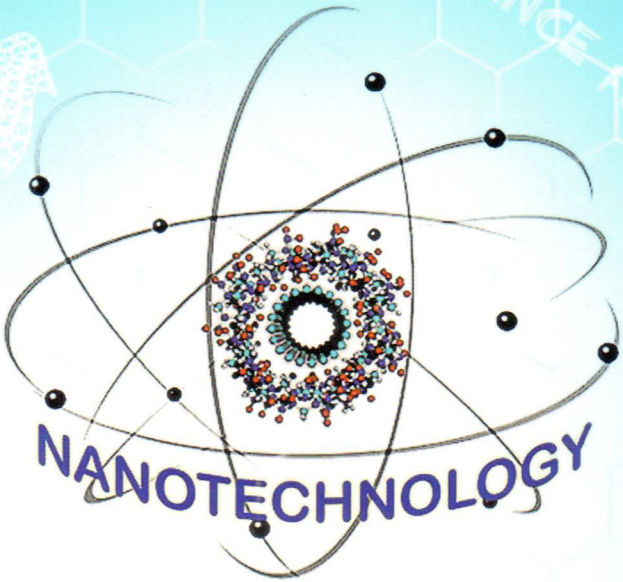

ABSTRACT BOOK

International research and practice conference:

NANOTECHNOLOGY AND NANOMATERIALS (NANO-2018)

27-30 August 2018
Kyiv, Ukraine

dedicated to the 100th Anniversary
of the National Academy of Sciences of Ukraine

INTERNATIONAL RESEARCH AND PRACTICE CONFERENCE "NANOTECHNOLOGY AND NANOMATERIALS" (NANO-2018)

27-30 August 2018
Kyiv, Ukraine

dedicated to the 100th Anniversary of the National Academy of Sciences of Ukraine

BOOK OF ABSTR
ACTS

Forced oscillations of an Abrikosov's vortex in superconductors

Rusakov V.F.[1], Chumak A.[2,3], Nabiałek A.[3], Chabanenko V.V.[2]

[1] *Vasyl' Stus Donetsk National University,21, 600-Richchya st., Vinnytsia21021, Ukraine.*
E-mail: nadezhda.rus@gmail.com
[2] *Galkin Donetsk Institute of Physics and Technology NAS of Ukraine, 46 Nauki av., Kiev03680, Ukraine.*
[3] *Institute of Physics, Polish Academy of Sciences, Al. Lotników 32/46, Warsaw 02-668, Poland.*

Superconductors type II, in magnetic fields ($H_{c1}<H<H_{c2}$), contain quantized nanosize whirlpools of electrons, called Abrikosov vortices. Dynamical properties of single vortex line in $YBa_2Cu_3O_{6,991}$ single crystal (hard superconductors) were investigate experimentally with the aid of magnetic force microscopy (MFM) [1]. Here the image, motion and deformation of individual vortices were presented. The simple theory of this experiment considering the dragging force, the pinning force, and an elastic force were build in [2]. In the present report, we consider single Abrikosov vortex line ($H \geq H_{c1}$) dynamics under the action external force, which varies in the plane and decays into the interior of the sample $\vec{f}(x,y,z) = \vec{i}f_0 e^{-z/\lambda} cos wt + \vec{j}k e^{-z/\lambda} \sin \Omega t$, $(\Omega << \omega)$, taking into account additionally inertial properties of the vortex [3] and Lorentz force. Different scenarios of vortex line trajectories in two-dimensional model were considered. The data obtained make it possible to qualitatively explain the experimental results of manipulations of a single vortex, presented in [1]. The influence of each of the forces on the shape of the vortex trajectory is analyzed, and it is shown that the Lorentz force plays the most important role.

1. *Auslaender O.M., Luan L., Straver E.W.J., Hoffman J.E., et.al. Mechanics of individual isolated vortices in a cuprate superconductor // Nature Physics.-2009.-5.-P.35-39.*
2. *Brandt E.H., Mikitik G.P. and Zeldov E. Deforming and moving a vortex by the tip of a magnetic force microscope // Physica C.-2010.-470.-P. 782-785.*
3. *E. B. Sonin, V. B. Geshkenbein, A. Oterlo, and G. Blatter. Vortex motion in charged and neutral superfluids //Phys. Rev. B.-1998.-57.-P. 575-581.*

Author Index

S