MULTIPLE PHASE SLIP PHENOMENA IN 1D SUPERCONDUCTORS

Vladimir Baranov[a], **Viktor Kabanov**[a]

[a]Jozef Stefan Institute, Jamova 39, SI 1000 Ljubljana, Slovenia

9.7 cm

The current-voltage (IV) characteristics of thin superconducting wires are investigated by direct numerical integration of time-dependent Ginzburg-Landau equations (TDGL) [1] for different lengths of the wire. We have discovered few universal features of the IV characteristic that are independent on the wire's length. We have demonstrated that singularities of IV curve correspond to different bifurcation points of TDGL. The voltage appearance corresponds to the saddle-node homoclinic bifurcation leading to the formation of the limit cycle with the diverging period when $j \to j_c$. The phase slip centers (PSC) are formed in the center of the wire and IV characteristic has square root singularity [2]. The second singularity corresponds to the period doubling bifurcation. In that case two PSC's are placed symmetrically with respect to the center of the wire. Further increase of the current leads to a nonuniversal behaviour depending on the length of the wire. For longer wires the third PSC may appear in the middle of the wire. In addition, we have found some narrow regions of the current where relatively simple periodic solutions coexist with the limit cycles of higher orders.

References

[1] L.P. Gor'kov, N.B. Kopnin, Sov. Phys. Usp., 18, 496 (1975)

[2] L.G. Aslamazov, A.I. Larkin, JETP Letters, 9, 87 (1968)

13.4 cm

Subject category :

1. Strongly Correlated Electrons and High Temperature Superconductivity

Presentation mode :
poster

Corresponding author :
Vladimir Baranov

Address for correspondence :
Jozef Stefan Institute/F7, Jamova 39, SI 1000 Ljubljana, Slovenia

Email address :
vladimir.baranov@ijs.si