Fluxon Dynamics in Elliptic Annular Josephson Junctions - DTU Orbit (09/11/2017)

Fluxon Dynamics in Elliptic Annular Josephson Junctions

We analyze the dynamics of a magnetic flux quantum (current vortex) trapped in a current-biased long planar elliptic annular Josephson tunnel junction. The system is modeled by a perturbed sine-Gordon equation that determines the spatial and temporal behavior of the phase difference across the tunnel barrier separating the two superconducting electrodes. In the absence of an external magnetic field, the fluxon dynamics in an elliptic annulus does not differ from that of a circular annulus where the stationary fluxon speed merely is determined by the system losses. The interaction between the vortex magnetic moment and a spatially homogeneous in-plane magnetic field gives rise to a tunable periodic non-sinusoidal potential which is strongly dependent on the annulus aspect ratio. We study the escape of the vortex from a well in the tilted potential when the bias current exceeds the depinning current. The smallest depinning current as well as the lowest sensitivity of the annulus to the external field is achieved when the axes ratio is equal to root 2. The presented extensive numerical results are in good agreement with the findings of the perturbative approach. We also probe the rectifying properties of an asymmetric potential implemented with an egg-shaped annulus formed by two semi-elliptic arcs.

General information

State: Published
Organisations: Department of Physics, Consiglio Nazionale delle Ricerche
Authors: Monaco, R. (Ekstern), Mygind, J. (Intern)
Number of pages: 13
Pages: 1-13
Publication date: 2016
Main Research Area: Technical/natural sciences

Publication information

Journal: Journal of Low Temperature Physics
Volume: 183
Issue number: 1-2
ISSN (Print): 0022-2291
Ratings:

BFI (2017): BFI-level 1

Web of Science (2017): Indexed yes

BFI (2016): BFI-level 1

Scopus rating (2016): SJR 0.524 SNIP 0.855 CiteScore 0.95

Web of Science (2016): Indexed yes

BFI (2015): BFI-level 1

Scopus rating (2015): SJR 0.529 SNIP 0.639 CiteScore 0.8

BFI (2014): BFI-level 1

Scopus rating (2014): SJR 0.634 SNIP 0.892 CiteScore 1.03

BFI (2013): BFI-level 1

Scopus rating (2013): SJR 0.725 SNIP 0.688 CiteScore 1.02

ISI indexed (2013): ISI indexed yes

BFI (2012): BFI-level 1

Scopus rating (2012): SJR 1.102 SNIP 0.85 CiteScore 1.2

ISI indexed (2012): ISI indexed yes

BFI (2011): BFI-level 1

Scopus rating (2011): SJR 1.106 SNIP 0.755 CiteScore 1.06

ISI indexed (2011): ISI indexed yes

BFI (2010): BFI-level 1

Scopus rating (2010): SJR 0.903 SNIP 0.651

BFI (2009): BFI-level 1

Scopus rating (2009): SJR 0.955 SNIP 0.902

BFI (2008): BFI-level 1

Scopus rating (2008): SJR 1.115 SNIP 0.585

Scopus rating (2007): SJR 0.791 SNIP 0.56

Web of Science (2007): Indexed yes

Scopus rating (2006): SJR 0.762 SNIP 0.442

Scopus rating (2005): SJR 0.68 SNIP 0.623

Web of Science (2005): Indexed yes

Scopus rating (2004): SJR 0.823 SNIP 0.561
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 1.173 SNIP 1.039
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 0.835 SNIP 0.586
Scopus rating (2001): SJR 1.148 SNIP 0.538
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 1.092 SNIP 0.906
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 1.047 SNIP 0.597
Original language: English
Josephson effect, Sine-Gordon equation, Soliton dynamics, Ratchet potential
DOIs:
10.1007/s10909-016-1482-3
Source: FindIt
Source-ID: 2290405848
Publication: Research - peer-review › Journal article – Annual report year: 2016