Inverse Spin Hall Effect in Josephson Contacts

SEVERIN SADJINA, Norwegian University of Science and Technology, ANATOLII MAL’SHUKOV, Russian Academy of Sciences, ARNE BRATAAS, Norwegian University of Science and Technology — We demonstrate that Rashba spin orbit coupling together with Zeeman fields create an effective electromagnetic vector-potential in the normal part of an SNS Josephson junction in thermal equilibrium. Consequently, a phase difference between order parameters of the two superconducting terminals is induced, in analogy to the Meissner effect. The resulting phase-coherent equilibrium supercurrent is a counterpart of the non-equilibrium inverse spin Hall effect in normal metals. The calculations have been carried out in the diffusive regime on the basis of Usadel equations and assuming low transparency tunneling contacts. Apart from this effect, we also consider an in-plane homogeneous Zeeman field in the transverse direction.

Severin Sadjina
Norwegian University of Science and Technology

Date submitted: 20 Nov 2009

Electronic form version 1.4