

Multiple Andreev reflections in diffusive SINIS and SIFIS junctions

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In recent years, transport properties of superconductive junctions have been an important topic. One of the proximity effects, detected in such structures, is Andreev reflections (AR)[2], which were studied. In this work, we consider long diffusive superconductor-normal metal-superconductor junctions with low transparency interfaces at sufficiently low temperatures, $E_{\text{Th}} \ll T \ll \Delta$. In our computation, we take into account proximity effects alongside with inelastic scattering processes in a normal region, which leads to thermalization in the weak link. Our calculations reveal, that current-voltage characteristic of such a junction has peculiarities on specific values of voltage bias, corresponding to AR. Furthermore, we find that weak exchange field in normal region produces linear splitting of these peculiarities. We assume, that such splitting is a direct consequence of thermalization in normal region, therefore we propose a modification of Blonder-Tinkham-Klapwijk [1] semiconductor scheme of calculating voltages, corresponding to AR.

References

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