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Numerical study of transport through a mesoscopic superconducting device LUCIAN COVACI, FRANK MARSIGLIO, Department of Physics, University of Alberta — Starting from the tight-binding description of a superconductor, with the use of the extended Hubbard Hamiltonian, we rely on real-space methods to describe the properties of a superconducting device. The Bogoliubov de Gennes equation are solved for the superconducting device and the Keldysh Green's functions are calculated. We use a perturbation method, first introduced by Caroli et al., which considers the connection of two semi-infinite leads to the superconducting device as a perturbation. The leads can be either in the normal state or in the superconducting state, leading to interesting effects on the Andreev processes inside the superconductor. Using this approach we calculate microscopic currents through a 2D superconducting device.

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