

Nonequilibrium superconductivity of phase-slip devices in magnetic fields

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In a quasi-two-dimensional superconducting microbridge, the phase of the superconducting current becomes to slip, resulting in a non-equilibrium superconducting state as shown in Fig. 1. [1] A non-equilibrium transition has been observed in the hysteresis of the critical current in a magnetic field [2][3], which suggests the interaction between the non-equilibrium Josephson current and the quasi-particle currents.[4] Similar to the two-dimensional Josephson junction, the critical current of the dissipative Josephson weak coupling with phase-slip occurs only when there is fluctuation or non-uniformity, and the hysteresis phenomenon due to the magnetic field occurs under the influence of the shielding current in the electrodes. We have confirmed this behavior experimentally and theoretically.

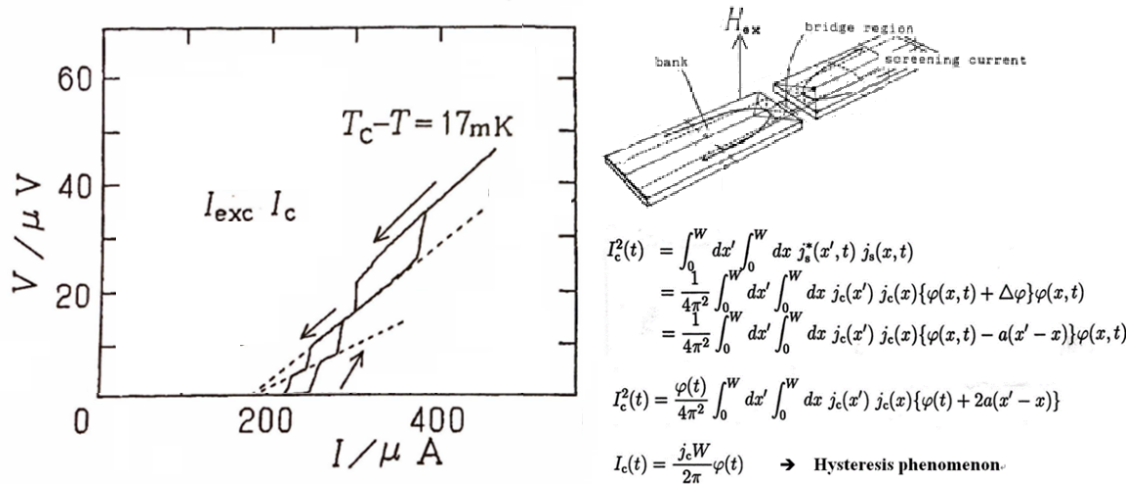


Fig 1. phase-slip lines with shielding currents

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