Analytical Result on the Supercurrent Through a Superconductor/Quantum-Dot/Superconductor Junction

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Abstract: We present an analytical result for the supercurrent across a superconductor/quantum-dot/superconductor junction. By converting the current integration into a special contour integral, we can express the current as a sum of the residues of poles. These poles are real and give a natural definition of the Andreev bound states. We also use the exact result to explain some features of the supercurrent transport behavior.

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