A Reference Current Optimizer for Double Relaxation Oscillation SQUID with Reference Junction (RJ-DROS)

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We have developed an optimizer to control the flux-to-voltage characteristics of the double relaxation oscillation SQUID with a reference junction (RJ-DROS) that already has a fixed reference current and a fixed flux-to-voltage characteristics when it is fabricated. A reference current optimizer regulates an additional current flowing through the reference junction in RJ-DROS, which provides RJ-DROS with variable modulation depth and width as DROS with a reference SQUID (RS-DROS). Since the optimizer doesn't require modifying RJ-DROS structure and doesn't need more wires to transfer a current to the reference junction, an existing RJ-DROS and flux-locked loop (FLL) electronics can be available for the optimizer. Therefore, the RJ-DROS with the optimizer can achieve simpler structure than RS-DROS in case that DROS needs the variable characteristics. Although the characteristics of RJ-DROSs are fixed somewhat differently each to each at the time when they are fabricated, the optimizer can adjust their characteristics to the same one for a multi-channel DROS system. Moreover, if the input-bias current of a preamplifier detecting outputs of RJ-DROS makes a reference current shift from an optimum current or deviate from the operating range, the optimizer can reconstruct it within the optimum range as well.

Keywords : DROS, flux-to-voltage, magnetocardiography, SQUID.