Design of 150-channel Whole Head SQUID Magnetometer System for Neuromagnetic Measurements

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We designed a whole head SQUID magnetometer system for neuromagnetic measurements. The magnetometers use the double relaxation oscillation SQUID with integrated pickup coil, and the fabricated magnetometers have white a noise level of 3 fT/√ Hz. The helmet-type sensor distribution has 150 magnetometers where the average distance between two adjacent channels is 3 cm. To increase the information capacity, we adopted a triangular lattice sensor distribution. The helmet dewar was designed based on the standard Korean head shape and it can accommodate 95 % of all Korean adults. The localization error of the magnetometer system was computed, and compared with other whole head systems, such as axial gradiometer system and dual planar gradiometer system. The SQUID electronics have low-noise preamplifiers with input white noise level of 1 nV/√ Hz, and the SQUID operation could be done using digital control.

keywords : SQUID magnetometer, neuromagnetic measurement, SQUID electronics