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Optimum design of the outer shield layer in an innovative superconducting DC cable

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The structure of the inner conductor of the innovative superconducting DC cable has been discussed and we proposed the optimum structure in which superconducting tapes were arranged to decrease the Lorentz force in local magnetic field. However, the design of the outer shield conductor of the cable that applies the axial magnetic field to the inner conductor by the back current has not been argued. It is needed to optimize the structure, the angle distribution of the superconducting tapes, of the outer shield conductor under the required conditions of the capacity of the back current and the axial field strength. In this study the optimum condition is investigated to provide the maximum longitudinal magnetic field to the inner part of the cable under the condition of the same current as the inner part. The total efficiency of the proposed innovative cable will be discussed based on the obtained results.

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