Design and Tests of Prototype HTS Power Transmission Cable

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The underground power transmission systems have to be expanded according to the increasing power demand in urban area, but it is very difficult to construct new cable tunnels and ducts to install additional underground transmission lines. And it is almost impossible to retrofit larger diameter cables in the existing underground tunnels. HTS power transmission is one of the most feasible solutions for solving the above problems. HTS power transmission cables appear to be the replacement and retrofitting of underground cable in urban areas and HTS power transmission cable offers a number of technical and economic merits compared to normal conductor cable system.

HTS power transmission cables consist of multi layer HTS tapes, it is very important to realize the uniform current distribution of each layer to reduce the AC loss. For optimization the HTS power transmission cable, the cable twist pitches have to control for each layer. The HTS power transmission cables were designed by the conventional electric circuit model and prototype cable conductors fabricated. The cable conductors were wound four layers of Ag/Bi-2223 tapes and tested with both DC and AC currents in liquid nitrogen. In this paper, the results of design and DC and AC transport characteristics of four layer HTS power cable conductors were described.

keywords : HTS power transmission cable, twist pitch, cable design, current distribution