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The high-power test of CW 250 kW fundamental power couplers for HEPS 166.6 MHz superconducting quarter-wave beta=1 cavity

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High Energy Photon Source is a 6 GeV diffraction-limited synchrotron light source currently under construction in Beijing. To provide the required 6 MV of RF voltage and 850 kW of beam power, five 166.6 MHz superconducting quarter-wave beta=1 cavities have been chosen for the fundamental RF system of the storage ring. Each cavity will be equipped with one fundamental power coupler (FPC) capable of delivering over 200 kW continuous-wave (CW) RF power. Based on the test performances of the two prototype couplers, formal couplers have been optimized, fabricated and high-power tested up to CW 250 kW in the traveling-wave mode and CW 100 kW in the standing-wave mode covering 16 phase points. Subsequently, one FPC was mounted on the first 166.6 MHz SRF cavity and participated in the horizontal high-power tests of the first cryomodule. The high-power test performances of the formal FPCs on the test bench and with the dressed cavity are presented in this paper, focusing on the effectiveness of the various design modifications compared with previous prototypes.

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Footnotes

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