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Development of test bench for 324 MHz superconducting cavity power couplers

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The power coupler is one of the most important components for superconducting cavities. Different from the normal conducting cavity, the superconducting cavity has to keep an ultra-high cleanliness environment for operation. As the vacuum barrier, power couplers are welded by many different materials and maybe the gas source since they are installed to the cavities after vertical test, therefore, they should be high power conditioned before operation. Generally speaking, test bench equipment with two power couplers is often designed to improve the high conditioning efficiency. In this paper, different types of test benches are compared according to simulation and the cylindrical quarter-wavelength cavity is chosen. Besides, the detailed electromagnetic and mechanical design of the test bench is presented; to verify machining accuracy, two test pieces are also designed to measure the transmission of the test bench. In addition, to meet the high power conditioning of different power couplers, the test bench is optimized to have a capacity of 300 kW CW forward power. Finally, limited by the output power of klystron, the test bench with a pair of couplers is high power conditioned to a standing power level of 500 kW with a repetition rate of 25 Hz and a pulse width of 1.2 ms.

Footnotes

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Paper preparation format

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Asia

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