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On forced RF generation of CW magnetrons for superconducting accelerators

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CW magnetrons, initially developed for industrial RF heaters, were suggested to power RF cavities of superconducting accelerators due to their higher efficiency and lower cost than traditionally used klystrons, IOTs or solid-state amplifiers. RF amplifiers driven by a master oscillator serve as coherent RF sources. CW magnetrons are regenerative RF generators with a huge regenerative gain. This causes regenerative instability with a large noise when a magnetron operates with the anode voltage above the threshold of self-excitation. Traditionally for stabilization of magnetrons is used injection locking by a quite small signal. Then the magnetron except the injection locked oscillations may generate noise. This may preclude use of standard CW magnetrons in some SRF accelerators. Recently we developed briefly described below a mode for forced RF generation of CW magnetrons when the magnetron startup is provided by the injected forcing signal and the regenerative noise is suppressed. The mode is most suitable for powering high Q-factor SRF cavities.

Footnotes

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