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Vector Control Algorithm for Efficient Fan-Out RF Distribution *

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A fan-out power distribution algorithm with RF vector control using reactive transmission line circuit parameters for maximum power efficiency is presented. If a fixed power splitting system with individual cavity voltage control at each cavity input is used, the power efficiency becomes lower since the RF power source must deliver more power than needed by cavities. The proposed fan-out power distribution system is considered valuable for large scale SRF accelerator systems to save costs in construction and operation. In this fan-out system, feeding multiple accelerating cavities with a single RF power generator can be accomplished by adjusting phase delays between the load cavities and reactive loads at the cavity inputs for independent vector control of cavity RF voltages. A set of RF control parameters is determined for a whole fan-out system to deliver a set of required cavity RF voltage vectors. The reactive loadings and phase shifts can be realized using high power RF phase shifters.

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