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# Multiobjective Optimization of Cyclotron Cavity Model using Neural Network

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Design optimization for a cyclotron is important for obtaining a high accelerating voltage to increase efficiency. A different cavity geometry made from the same material usually will have a different quality factor, which might affect the turn separation, especially if the electric field at the accelerator zones changes. For this purpose, a neural network is trained to give predictions of several accelerating cavity quantities given some initial parameters related to the geometry of the cavity, using training data obtained from an electromagnetic numerical solver for rf cavity. The optimization is done using the multiobjective optimization scheme due to the fact that optimization is constrained by several operational parameters, such as the RF frequency. We show that the use of neural network combined with multiobjective optimization can be implemented for cyclotron cavity design optimization.

## Primary Keyword

ML-based optimization

## Secondary Keyword

surrogate model architecture

## Tertiary Keyword

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