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Tuning gain and bandwidth of traveling wave tubes using metamaterial beam-wave interaction structures

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We employ metamaterial beam-wave interaction structures for tuning the gain and bandwidth of short traveling wave tubes. The interaction structures are made from metal rings of uniform cross section, which are periodically deployed along the length of the traveling wave tube. The aspect ratio of the ring cross sections is adjusted to control both gain and bandwidth. The frequency of operation is controlled by the filling fraction of the ring cross section with respect to the size of the period cell. [http://dx.doi.org/10.1063/1.4897235]