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Physics of Frequency Step-tuning in Terahertz Traveling Wave Tube Regenerative Oscillators[1] JOHN BOOSKE, University of Wisconsin, Madison, PENG GAO, University of Wisconsin, Madison and University of Electronic Science and Technology of China, Chengdu — Efficient generation (higher than 0.3 percent) of terahertz regime radiation was recently demonstrated with a traveling wave tube (TWT) regenerative oscillator using a folded waveguide (FWG) slow wave circuit [1]. By varying the beam voltage between 9.2 and 10 kV, the oscillation frequency was observed between 607-675 GHz. However, step-tuning rather than the expected smooth variation of frequency was observed. Theoretical analyses show that constructive phase interference between the passive backward wave and the recirculated feedback wave leads to step tuning. Results will be presented, including the effects of circuit loss.

[1] J. Tucek, et al, Conf. Digest, 2007 IEEE Intl Vac. Elec. Conf., pp. 219-220 (IEEE Cat. No. 07EX1526).

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