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The waveguide effect of FEL oscillator at different horizontal size

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In the long wavelength range of FEL oscillator, especially in FIR & THz, the vacuum chamber is designed as waveguide to suppress the diffraction effect during propagation. Meanwhile it will also bring some other effect, such as frequency shift, spectral gap, truncation loss and so on. The waveguide effect is studied mostly based on simple parallel plate situation by setting the horizontal size of rectangular waveguide as infinity. While in our simulation it reveals that this horizontal size can also affect the output power, the spectral gap is shifted by the horizontal size slightly. This is more clearly in FIR & THz wavelength range. Besides, the simulation results of FEL oscillator in different horizontal size and mirror curve is shown. The results shows that the waveguide size should be in match with cavity mirror curve to get the best FEL oscillator performance.

Footnotes

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