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Title:Coherent terahertz radiation from high-harmonic component of modulated free-electron beam in a tapered two-asymmetric grating structure

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Abstract:Based on the mechanism of incoherent diffraction radiation excited by an electron bunch in a waveguide with periodic structure, this paper presents the concept of coherent terahertz (THz) radiation from the high-harmonic component of a modulated free-electron beam in a tapered two-asymmetric grating structure. The results show that in this mechanism 0.43 THz radiation can be generated with  $10 \text{ A/cm}^2$  current density, and the efficiency can reach 0.5%. Because of the low required current density and relative high efficiency, this concept shows the application potential for electron-beam-driven terahertz sources.

Number of references:26

Inspec controlled terms:diffraction gratings - electron beams - periodic structures - terahertz waves - waveguides

Uncontrolled terms:electron-beam-driven terahertz source - periodic structure - waveguide - electron bunch - incoherent diffraction radiation - tapered two-asymmetric grating structure - modulated free-electron beam - high-harmonic component - coherent terahertz radiation - frequency 0.43 THz

Inspec classification codes:A4280F Gratings, echelles - B1310 Waveguides and striplines - B5150

Moving charges in electric and magnetic fields

Numerical data indexing:frequency  $4.3\text{E}+11 \text{ Hz}$

Treatment:Practical (PRA); Theoretical or Mathematical (THR)

Discipline:Physics (A); Electrical/Electronic engineering (B)

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