Design of Bidirectional Subwavelength Slit Coupler for THz Surface Plasmons

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Highlight

Introduction

• Part 1  Introduction
• Part 2  Design of the Plasmonic Surface Wave Splitter
• Part 3  Bidirectional Subwavelength Slit Coupler for THz Surface Plasmons
• Era of Electronics

Part 1 Introduction

• Era of Photonics?
Part 1 Introduction

**Spoof SPPs:** The concept of “designer” surface modes opens opportunities to control and direct radiation at surfaces within a subwavelength region, especially for GHz to THz frequencies.

Part 1  Introduction
Part 2  Design of the Plasmonic Surface Wave Splitter
Part 3  Bidirectional Subwavelength Slit Coupler for THz Surface Plasmons
Plasmonics Surface Wave Splitter

In Visible and near IR spectrum

Efficient unidirectional nanoslit couplers for surface plasmons

- Asymmetric surface structures on the two sides of the slit
- Use the 1D grating structure as DBR reflector

Careful choice of the distance between the slit and the groove array allows the reflected SPPs to constructively interfere with the SPPs traveling in the opposite direction — the direction the authors wish them to travel.

In Visible and near IR spectrum

Dispersion curves of the metal grating structures

Eigenvalue equation of the 1D groove array

\[
\frac{d}{p} \sum_{n=-\infty}^{\infty} \frac{1}{\tau_n h} \left( \text{sinc} \frac{\beta_n d}{2} \right)^2 = \frac{\cot kh}{kh}
\]

Highlight

THz Surface Plasmons

- Part 1 Introduction
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- Part 3 Bidirectional Subwavelength Slit Coupler for THz Surface Plasmons
Bidirectional Subwavelength Slit Coupler for THz Surface Plasmons

Coupler Part:

Bidirectional Subwavelength Slit Coupler for THz Surface Plasmons

Splitter Part:

(a) 0.5THz (b) 1THz
Design of Bidirectional Subwavelength Slit Coupler for THz Surface Plasmons

Part 1  Introduction
Part 2  Design of the Plasmonic Surface Wave Coupler
Part 3  Unidirectional and Bidirectional Subwavelength Slit Coupler for THz Surface Plasmons
Thank you