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Titre : Lentille de Rotman intégrée à un guide d'ondes à substrat de bande X

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Résumé : Cet article présente un guide d'ondes à substrat intégré (SIW) novateur pour des applications de détection en bande X. Il utilise une lentille de Rotman (RL) SIW comme réseau de commutation de faisceau. Une lentille prototype est conçue avec 7 ports de faisceau et 9 ports de réseau. Les résultats simulés autour de la fréquence de 10 GHz démontrent la validité de la conception proposée et sa capacité de balayage sur  $\pm 24^\circ$ . Le processus de conception de la lentille micro-ondes proposée pour une application de détection en bande X est mis en œuvre avec la technologie SIW. Dans ce travail, une nouvelle lentille avec la technologie SIW est proposée pour alimenter une antenne en réseau afin de générer plusieurs faisceaux. Étant donné que plusieurs faisceaux peuvent être obtenus simultanément en réutilisant l'ouverture de l'antenne, la fréquence et les fonctions multiples peuvent être intégrées dans un seul système électronique. Les résultats simulés autour de la fréquence de 10 GHz démontrent. La lentille proposée, composée de sept ports de faisceau, neuf ports de réseau et huit ports factices, a été conçue pour fonctionner à la fréquence centrale de 10 GHz, sur un substrat RO5880 avec une permittivité électrique de 2,2 et une épaisseur de 0,508 mm. La lentille Rotman proposée est conçue pour neuf éléments de rayonnement en réseau linéaire. Sept ports de faisceau ont été mis en œuvre dans la lentille proposée pour générer sept faisceaux à  $0^\circ$ ,  $\pm 8^\circ$ ,  $\pm 16^\circ$  et  $\pm 24^\circ$ , respectivement.

Mots-clés : Antenne orientable à gain élevé en bande millimétrique, Réseaux sans fil 5G, Diagramme de rayonnement, Axe de face principale, Antenne patch à diagramme de face principale annulé, Guide d'ondes à

rainure en crête, Métasurface à gradient de phase, Surface PGM, Surface souple, Cellules unitaires de forme carrée, Substrat hôte, Permittivité relative, Fréquence 60,0 GHz.

## X-band Substrate Integrated Waveguide Rotman Lens

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This paper presents a novel substrate integrated waveguide (SIW) for X-band sensing applications. It employs a SIW Rotman Lens (RL) as a beam switching network. A prototype lens is designed with 7 beam ports and 9 array ports. The simulated results around the frequency of 10-GHz demonstrate the validity of the proposed design and scanning capability over  $\pm 24^\circ$ . The design process of the proposed microwave lens for X-band sensing application is implemented in SIW technology. In this work, a new lens with SIW technology is proposed to feed an array antenna to generate multiple beams. Since multiple beams are possible to be simultaneously obtained by reusing the antenna aperture, frequency and multiple functions can be incorporated in a single electronic system. The simulated results around the frequency of 10-GHz demonstrate. The proffered lens, which is comprised of seven beam ports, nine array ports and eight dummy ports, was designed to operate at the center frequency of 10-GHz, on an RO5880 substrate with electric permittivity of 2.2 and thickness of 0.508mm. The proposed Rotman lens is designed for a nine linear array radiation elements. Seven beam ports were implemented in the proposed lens to generate seven beams at  $0^\circ$ ,  $\pm 8^\circ$ ,  $\pm 16^\circ$  and  $\pm 24^\circ$ , respectively.

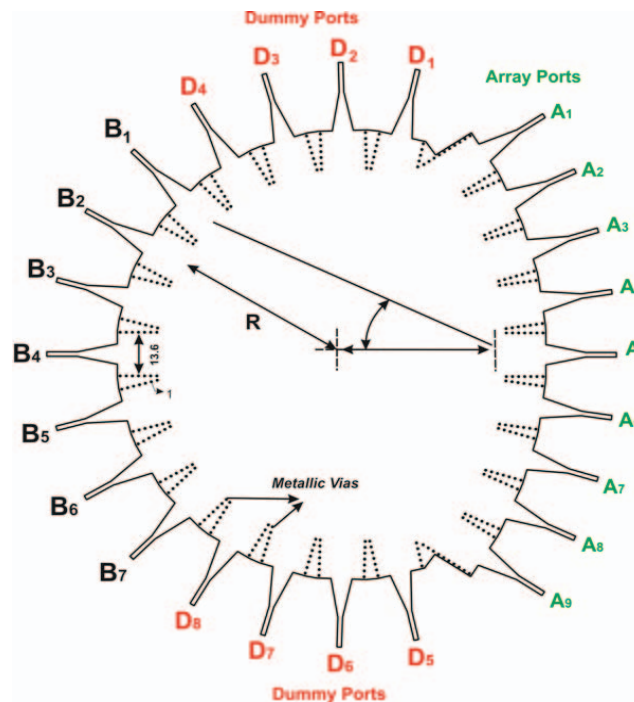


Fig. 1. Geometry of the realized SIW Rotman lens

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