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Transición de Guía de Gap Semi-Modo a Coaxial para Aplicaciones de Milimétricas

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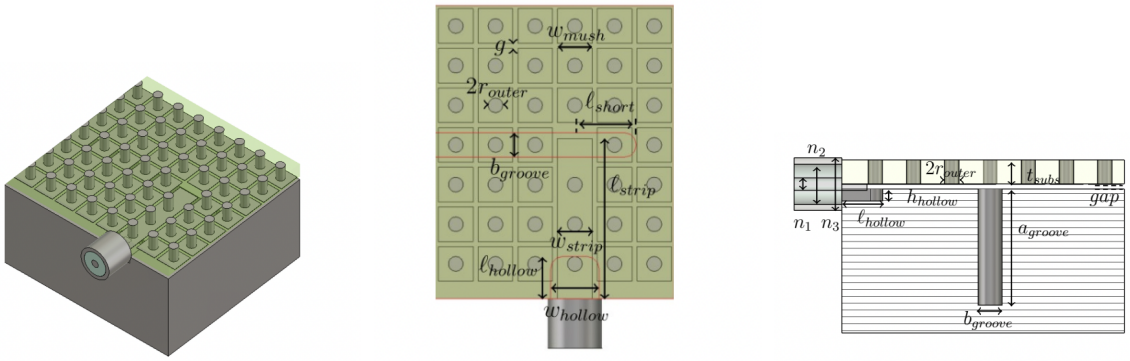
En esta comunicación se presenta una transición en línea entre la nueva tecnología de guía de ondas de ranura de media onda (HM-GGW) y una sonda coaxial en la banda Ka. El contexto del trabajo es el de las comunicaciones por satélite (SATCOM) y la necesidad de dispositivos de banda K/Ka más pequeños y de bajas pérdidas. El diseño consiste en una superficie de alta impedancia (HIS) que se realiza con un band gap electromagnético (EBG) tipo champiñón para facilitar su fabricación en una placa de circuito impreso (PCB). Se utiliza una etapa intermedia de guía de ondas de ranura de microstrip-ridge (MRGW) para conectar ambas estructuras debido a su fácil integración con el EBG tipo champiñón en la misma PCB. Los resultados simulados de la transición de punta a punta muestran una pérdida de retorno de 20 dB y una pérdida de inserción de 0.03 dB en la banda de frecuencia de 29-31 GHz.

El HM-GGW es una topología novedosa propuesta por primera vez en [1], que muestra que alojar la HIS (en ese caso pines metálicos) y el surco por el cual se distribuye la señal en dos placas metálicas diferentes alivia la complejidad sin perder las características ventajosas de la GW. Esto permite la fabricación independiente de estas piezas y el reuso de la estructura HIS en otros diseños. Además de los pines metálicos propuestos en esa primera comunicación se pueden utilizar otras HIS, como el EBG tipo champiñón, que se presenta en este trabajo.

El diseño de la transición propuesta utiliza una etapa intermedia MRGW para conectar el coaxial al HM-GGW. Esta estructura presenta pérdidas despreciables, ya que las ondas se transmiten en el espacio de aire entre las partes. Se optimizan los parámetros geométricos de la transición, incluyendo la longitud del MRGW y la posición del extremo de la ranura. Los resultados simulados muestran una buena coincidencia de impedancia y pérdida de retorno en la banda de frecuencia deseada.

En conclusión, se ha presentado una transición novedosa de HM-GGW a coaxial en la banda Ka. La transición propuesta utiliza una etapa intermedia MRGW y el EBG tipo seta en una PCB para lograr un diseño compacto. Los resultados simulados demuestran un buen rendimiento con una pérdida de retorno de 20 dB y una pérdida de inserción de 0.03 dB en la banda de frecuencia de interés. Esta transición ofrece una solución óptima para la interfaz entre dispositivos HM-GGW y sondas coaxiales, como antenas, diplexores y filtros. .



(a) (b) (c)

Figura 1. (a) Vistas frontal y lateral del híbrído usando HM-GGW (Half-Mode Groove Gap Waveguide). (b) Vista superior y perspectiva del híbrido sin la cama de pines superior, para una mejor visualización.

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