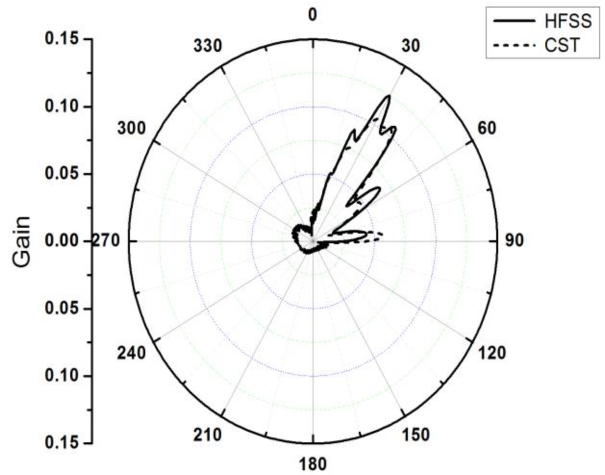
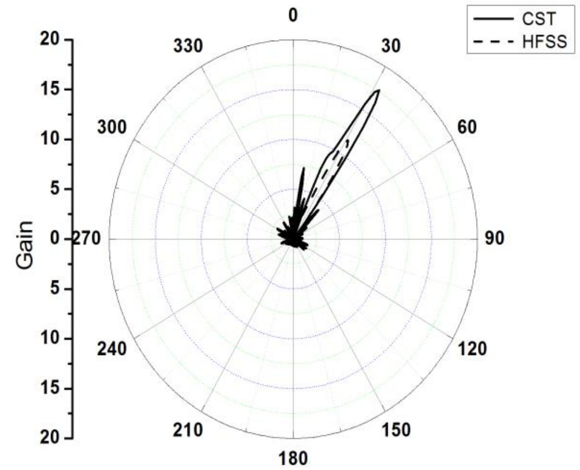


(a)



(b)

Figure 9: Gain (ratio) along E-plane at $f_0 = 300\ GHz$, (a) for doped silicon, and (b) for a thin gold film.

7.

In this paper, a sinusoidally modulated reactance surface leaky wave antenna on a grounded silicon substrate is discussed. The proposed antenna is designed to operate at a frequency of 300 GHz with a beam pointed to 30° for chip-to-chip communication. The analysis and design of the proposed antenna is presented in detail. The sinusoidally modulated reactance surface is implemented using varying width strips array above the grounded dielectric silicon substrate. Two configurations for these strips are introduced based on either highly doped silicon strips or gold strips. The antenna configuration based on highly doped silicon strips shows dissipative properties which introduce low efficiency and low antenna gain. However, this configuration is characterized by wideband matching properties and slowly varying radiation properties in a wide frequency band. On the other hand, the antenna configuration based on gold strips shows higher efficiency and higher antenna gain. However, this configuration is characterized by narrow band resonance behavior around the operating design frequency. According to the requirements of the proposed system, one can choose between wide band low efficiency antenna with doped silicon strips or narrow band high efficiency antenna with gold strips.

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