

Polarization/Frequency Hybrid Reconfigurable Microstrip Antenna

ABSTRACT:

In this letter, a frequency and polarization hybrid reconfigurable microstrip antenna utilizing graphene-based tunable resistors is proposed. The antenna consists of a T-shaped power divider, a 90° phase shifter and a circular patch. Two pairs of graphene nanoplates connected with open-circuit lines are loaded on the left and right feeding lines of the power divider. By applying bias voltage from 0 to 4V, the resistance of the graphene nanoplates can be dynamically tuned from 200 Ω to 20 Ω , thus the current flows through the graphene nanoplate to the open-circuit load, making the port inoperative. By choosing different single- or dual port operation, the antenna can realize horizontal polarization or vertical polarization in the frequency bands 10.84–11.02 GHz and 11.79–12.1 GHz bands, respectively, and right-handed circular polarization in two bands. In addition, the gain manipulation function is completed by adjusting the resistance of the graphene nanoplates.

ADVANTAGES

- 1. **Adaptability:** These antennas can switch between different polarizations (e.g., linear, circular) and frequencies, making them adaptable to changing communication requirements.
- 2. **Increased Efficiency:** By adjusting polarization and frequency, these antennas can improve efficiency in terms of signal transmission and reception, especially in diverse environments.
- 3. **Spectrum Management:** They enable efficient spectrum utilization by dynamically adjusting frequency characteristics based on the available spectrum.
- 4. **Reduced Interference:** By selecting appropriate polarization and frequency, these antennas can mitigate interference from other sources.
- 5. **Multiband Operation:** They can operate over multiple frequency bands, making them suitable for multi-frequency applications like modern wireless communication systems.

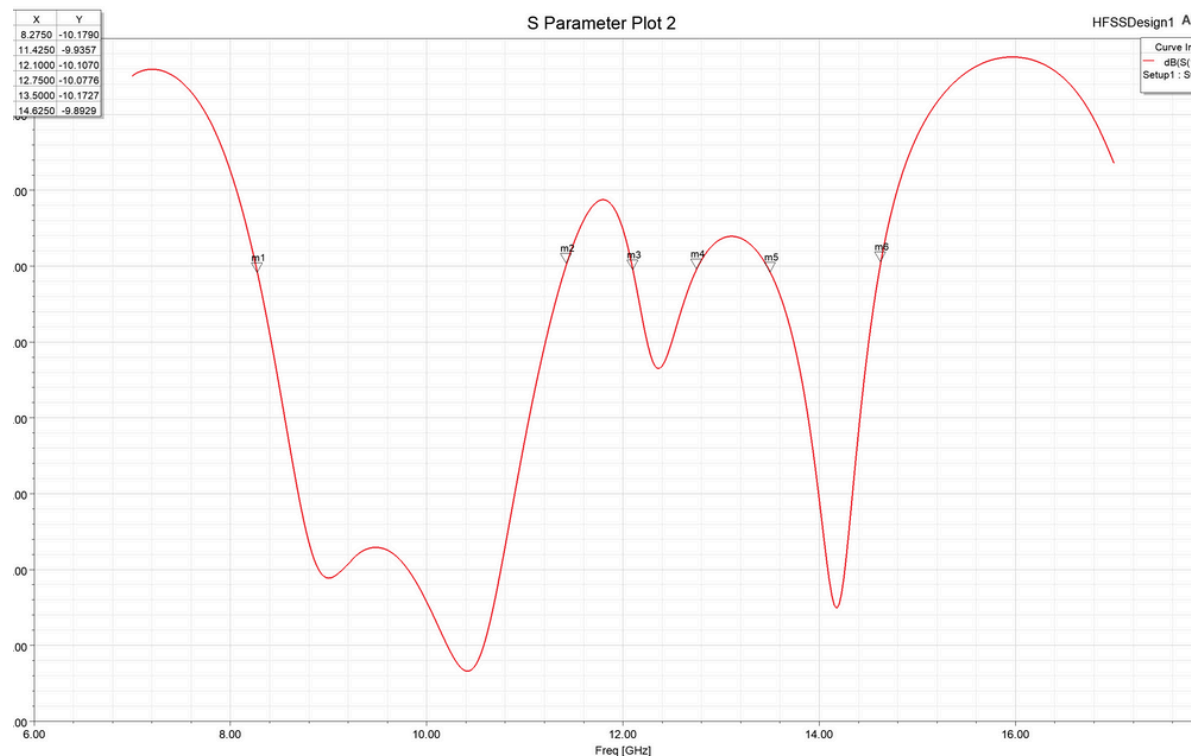


Fig 3. Gain Plot

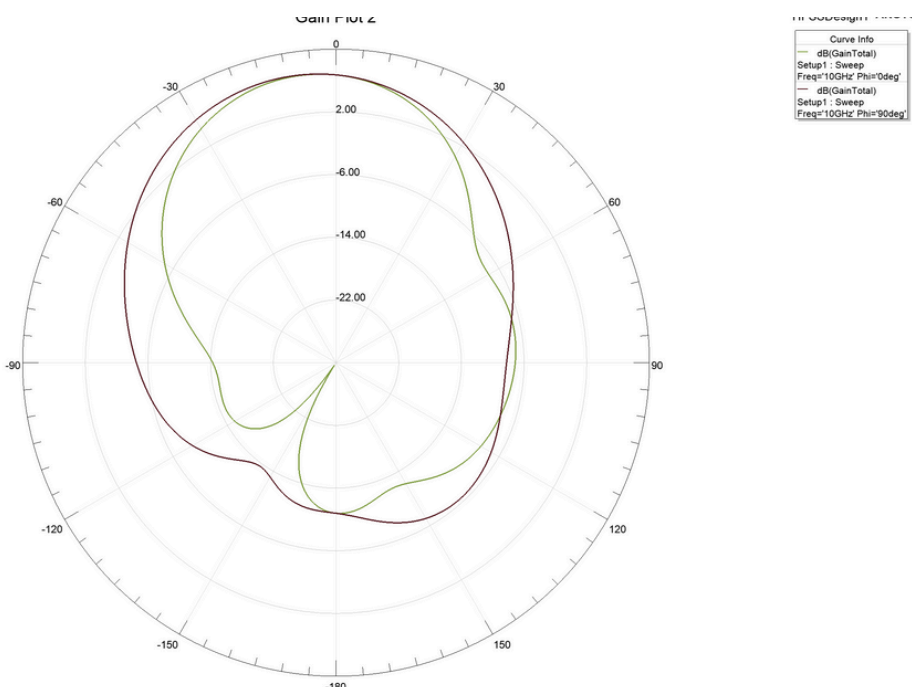


Fig 4. Radiation Pattern

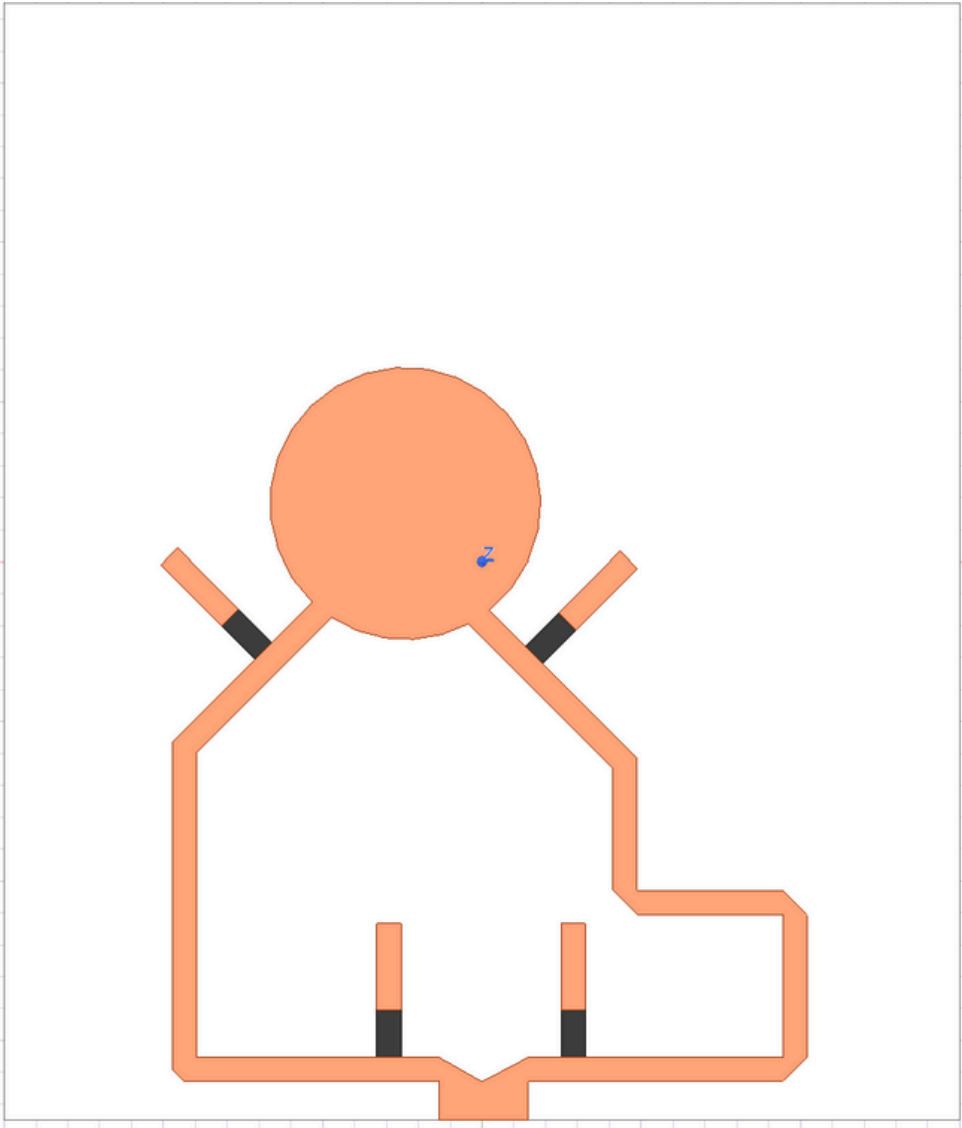


Fig 1. Reconfigurable Antenna

APPLICATIONS

- 1. Wireless Communication Systems
- 2. Satellite Communication
- 3. Radar Systems
- 4. Mobile Devices
- 5. Military and Defense Applications

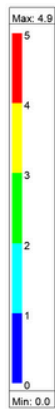


Fig 2. Radiation Pattern 3D