Abstracts

A distributed-feedback antenna oscillator

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In this paper, a new design of the active transmitting antenna array, called the distributed-feedback antenna oscillator, is proposed. The active array is formed by serially connecting several unit cells to a closed loop. Each unit cell contains an amplifier and a two-port antenna, with an overall insertion gain larger than 0 dB and a phase delay equal to a multiple of 360/spl deg/. The signal traveling on the loop is amplified and radiated in each unit cell. The radiation fields from all the antennas are then combined in free space. A four-element feedback antenna oscillator operating at 10 GHz is demonstrated by using two-port aperture-coupled microstrip antennas. Simulation results show that multiple oscillation modes with different frequencies and different radiation beams may be excited in the antenna oscillator. By experiment, it is found that each oscillation mode can be built by tuning the biases of the oscillator. The measured radiation pattern for each mode agrees very well with the predicted one. For a single-mode operation with a broadside pattern, bandstop filters of a simple geometry are designed and embedded in the oscillator to suppress the unwanted oscillation modes. Finally, the influence of the bias condition on the radiation power of the single-mode oscillator is investigated.

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