

60-GHz Electronically Reconfigurable Large Reflectarray Using Single-bit Phase Shifters

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A large electronically reconfigurable reflect-array antenna that has 160 x 160 reflecting elements was designed, fabricated, and evaluated so that it could be applied to a millimeter-wave imaging system operating in the 60-GHz band. To make it feasible to construct such a large reflect-array, the reflecting element structure had to be simple and easily controlled; therefore, a reflecting element consisting of a microstrip patch and a single-bit digital phase shifter using a p-i-n diode was employed. A large reflect-array antenna was fabricated using the reflecting elements. The measured radiation patterns and antenna gain were in good agreement with those that were calculated. Furthermore, near-field beam focusing capabilities, which are required to image near-field objects, were also verified through an experiment. Finally, the response time for beamforming was measured and it was far less than the system requirements.

Optical compensation of hologram distortion avoiding interpage crosstalk on reconstructed image in angle-multiplexed holograms

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We are studying a form of holographic data storage with phase conjugation, and we compensated for hologram distortion due to shrinkage of photopolymer materials in the holographic medium by controlling the wavefront of the reference beam. When a high NA lens and narrow angle interval of angle multiplexing are employed to obtain a high data recording density, some wavefronts cause interpage crosstalk on the reconstructed image. We tried to determine the moving range of actuators in a deformable mirror for controlling the wavefront. As a result, we found that the distortion in the hologram could be compensated while avoiding interpage crosstalk and that the bit error rates of the reproduced data could be decreased. We also found that the optimized wavefront could compensate for distortions in several neighboring data pages. This method can ensure a high data recording density in holographic data storage.