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Performance Enhancement of a Compact Wideband Patch Antenna Array Using EBG Structures

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Abstract— In this paper, a compact wideband linear microstrip phased array antenna (MPAA) is proposed. To reduce the size of MPAA, a compact wideband aperture coupled microstrip patch antenna (MPA) is utilized as array element. Size reduction of the array element is performed through incorporating an interdigital capacitor (IDC) in the patch and a metamaterial (MTM) unit cell close to slot in the ground plane of the antenna. By cutting two vertical slits from the slot, further compacting of the slot in the ground plane of array element is obtained. By this technique dimensions of the patch and slot are reduced by 12.9% and 12.2%, respectively. Furthermore, dimensions of the MPAA are reduced through decreasing the spacing between array elements causing the antenna performance degradation. To overcome this shortage and improve the radiation characteristics of the proposed MPAA, an electromagnetic bandgap structure (EBG) is utilized. The effect of implementing EBG cells on the reflection coefficient of the