Experimental Characterization on a Circularly Polarized Patch Antenna Incorporated with Bulk Ferrite Material

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Abstract—This paper deals with the experimental characterization on a circularly polarized patch antenna incorporated with bulk ferrite material. The patch antenna is arranged on a multilayer structure whereby double layer FR-4 epoxy dielectric substrates are utilized as a host material of antenna. Meanwhile, a bulk ferrite material is incorporated into the dielectric substrate aiming to acquire and strengthen the interaction between internal magnetization of ferrite material and electromagnetic field emitted by the patch fostering circularly-polarized wave radiation. A square shape of bulk ferrite material utilized for characterization is ferrimagnetic material, namely Yttrium Iron Garnet (YIG). The experimental characterization is performed on a demagnetized condition, in which the magnetization is released only by the internal magnetic bias of incorporated ferrite material. As comparison, the performance of patch antenna with a thin slot, commonly applied to produce a circularly polarized wave, is also characterized in terms of circular polarization capability. The characterization results show that the patch antenna incorporated with bulk ferrite material is able to provide circularly polarized radiation wave with comparative performances to the reference antenna.