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These figures show internal electric field distribution of the developed corrugated horn antenna using the momentum method. After the various deliberations, the antenna shows broadband performance which covers D-band (110 - 170 GHz). Unwanted modes were excited due to the standing wave in the lower frequency range as shown in the bottom left figure. Although these affect symmetric property of radiation pattern, the antenna is widely applicable for ECRH System. (Masatsugu SAKAGUCHI *et al.*, Plasma and Fusion Research Vol.8, 1405163 (2013) <http://www.jspf.or.jp/PFR/>)