

Simulation of electron density measurement in Taban tokamak via reflectometry system

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Since some tokamaks such as Taban are currently working with low density plasma, a fixed frequency reflectometer system was designed and constructed to monitor plasma production within the vacuum vessel. The system consists of a circular waveguide-antenna, a phase detector, bi-directional coupler and an RF signal generator. The waveguide antenna is working as both transmitter and receiver to measure the phase difference of transmitted and received signals. In order to evaluate performance of the antenna and also to predict the experimental results of electron density measurement in Taban tokamak, the process of electromagnetic wave transmitting from and receiving to an antenna model were simulated via CST software. The simulation were conducted within the reflectometer frequency range (1.7-2.5 GHz), which the plasma area was modelled so that to have the frequency of 2.4 GHz. In this paper, the simulations and their results will be presented in detail. Based on the simulation results, the reflectometer antenna performed appropriately all over the working frequency, since it could properly transmit and receive electromagnetic wave to and from the cut-off layer of the plasma.