NUMERICAL ANALYSIS OF MICROWAVE PLASMA MODULE FOR HYDROGEN PRODUCTION

Michał SOBAŃSKI, Mariusz JASIŃSKI
Jerzy MIZERACZYK

ABSTRACT Microwave plasma module (MPM) is used for hydrogen production via conversion of hydrocarbons. We present optimization of energy transfer in the waveguide-supplied coaxial-line-based MPM. The MPM operates at atmospheric pressure and frequency of 2.45 GHz. The MPM is terminated with movable plunger which plays the role of the tuning element. Tuning characteristics are defined as the dependence of the \( \frac{P_R}{P_I} \) as a function of the position \( l_s \) of the movable plunger, where \( P_R \) and \( P_I \) are power reflected and power incident, respectively. The powers \( P_R \) and \( P_I \) are measured in input plane of the MPM.

Optimization has been performed using Comsol Multiphysics software. The main construction elements which have been optimized are the length of the shorted coaxial line section, the diameter of the inner conductor of coaxial line and finally the height of the reduced height waveguide section.

Keywords: microwave plasma module, microwave plasma source, microwave discharges, hydrogen production