

Simulation Study of Supersonic Molecular Beam Injection as Fueling System for Thailand Tokamak I

J. Promping^{1*}, A. Wisitorsasak², B. Chatthong³, K. Nilkamhang¹, A. Tamman¹, P. Wonghabut¹, W. Sangwang¹, K. Saidarasamoot¹, N. Poolyarat¹ and S. Dangtip¹

¹ Thailand Institute of Nuclear Technology (Public Organization), Nakhon Nayok, Thailand

² Theoretical and Computational Physics Group, Department of Physics, Faculty of Science, King Mongkut's University of Technology Thonburi, Bangkok, Thailand

³ Department of Physics, Faculty of Science, Prince of Songkla University, Songkhla, Thailand

Thailand Institute of Nuclear Technology (TINT) is setting up the first tokamak in Thailand, dubbed as Thailand Tokamak I (TT-1), at its Nakorn Nayok site. Core components of TT-1 are taken from the previously known HT-6M tokamak, donated by Institute of Plasma Physics, Chinese Academy of Sciences (ASIPP), China. These core components are furnished with four up-to-date sub-systems. Fueling system is one of them and is important to maintain plasma density and improve plasma performance for high efficiency. Among three methods for fueling in a tokamak, namely, gas puffing (GP), supersonic molecular beam injection (SMBI), and pellet injection (PI); SMBI is chosen for TT-1. In this contribution, we present a simulation study of single-pulse SMBI for TT-1 to achieve plasma density of 10^{19} m^{-3} , 100 kA of plasma current, and for 100 ms pulse length. We have found that using SMBI injection speed of 600 m/s, the penetration depth is around 6 cm into the plasma. Therefore, the SMBI is sufficient to penetrate into the plasma core of small tokamak like TT-1. A comparison with other tokamaks of similar size and performance is also made in this contribution.

Keywords: Thailand Tokamak I, fueling system, SMBI