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P5.1039 Study of nitrogen seeded plasma in JET in preparation of JT60SA

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The operational conditions of DEMO require a high density and a high fraction of power radiated in the Scrape-Off Layer in order to fullfill the strict limits imposed by the material and the necessity to work in detached conditions. Indeed, almost the 95% of the input power must be radiated [1]. Various experiments in JET and ASDEX Upgrade have shown the possibility to work in high radiating scenarios, with a power fraction higher than the 75% by inserting external impurities as nitrogen or neon[2]. In the framework of the worldwide fusion community, JT60SA plays a crucial role in support of ITER in order to define possible scenarios of DEMO. In particular, one of the mission stems in the investigation of the feasibility of high density and high radiating scenarios, as in the Scenario 3[3], with a CFC tiles in the first phase and then with Tungsten wall in the second phase. These experiments shall give a deeper insight in the definition of both divertor and detachment conditions in presence of external impurity, as well as to provide a wide range of well diagnosed discharged necessary for the code validation[3]. In this contribution we present the study on a high triangularity N_2 seeded plasma in JET used as a reference for the study of the divertor conditions of the Scenario 3 of JT60SA. First of all, a benchmark of the simulation of SOLPS-ITER[4] with experimental data will be discussed by comparing the outputs of the code with different diagnostics as the High Resolution Thompson Scattering for the upstream conditions and Langmuir probe for the target. Therefore, the behaviour of SOL plasma and the stability of the detachment in high radiating scenario are investigated by changing the upstream density and the N_2 seeding rate.

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[2] Bernert M., (2017) Nuclear Materials and Energy 12 111-118 ISSN 2352-1791
[3] JT-60SA Research Plan, Version 4, September 2018
[4] S.Wiesen, et al., (2015) Journal of Nuclear Materials, 463, 480-484 1

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