Contribution ID: **808** Type: **not specified**

P2.237 Experimental measurements of pressure temperature and dust velocities: comparisons with a multiphase numerical model

Tuesday, 18 September 2018 11:00 (2 hours)

The production of dust inside the nuclear fusion power plants is one of the safety issues of this technology. Dust is generated because of plasma-material interactions and deposits in the bottom regions of the TOKAMAK. In case of a Loss Of Vacuum Accident (LOVA), the dust may be resuspended, threatening the functioning and the safety of these reactors. A deep study of this phenomenon is required to develop counter measurements and to improve the safety of this promising way to produce energy. The authors have studied the fluid dynamics of these accidents with a scaled experiment, called STARDUST-Upgrade. Optical techniques have been implemented to measure dust resuspension and diffusion properties, such as velocity vectors and resuspension-rate. In this work, the authors performed a numerical multiphase fluid dynamics simulation with a commercial code, using a Euler-Euler approach, a Schiller-Naumann resistance model, and a k-ε turbulence model. The dust used is carbon (graphite) dust, that has been placed close to the inlet valve in both cases (numerical and experimental). The numerical results are analysed and compared with the experimental ones and the main agreements and differences are highlighted. The results show good accordance about the velocity vectors of dust, while the resuspension rate is overestimated in the numerical case because of the absence of adhesion and cohesion forces between dust particles and walls. This analysis is the starting point for the evolution and completion of a numerical model suitable for dust resuspension in case of LOVAs.

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Session Classification: P2