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| **WPPWIE Deliverables Status Report** | | | | | **Date:** | | | 01-Sep-2022 | | |
| **Subproject:** | SP D / PSI and SOL Modelling | | | | **Deliverable ID** | | | PWIE-SP D.3.T-T002-D004 | | |
| **Deliverable owner:** | K. Schmid (MPG) | | | | **Deliverable due date** | | | 31-12-2022 | | |
| **WP Leader:**  **SP Coordinator:** | S. Brezinsek (FZJ)  A. Kirschner (FZJ) | | | |  | | |  | | |
| **Task title:** | SP D.3 Impurity Migration Modelling | | | | | | | | | |
| **Deliverable title:** | D4.1 Predictive tungsten migration in W7-X, D4.2 Beryllium/tungsten migration with realistic 3D ITER first wall. (MPG) | | | | | | | | | |
| **Status:** |  | **Completed** |  | **Partially completed** | |  | **Delayed** | |  | **Cancelled** |
| Please write a short status report (max. ½ pages) here.  Please check the status of the deliverable(s) with a “x” in the row above.  If the deliverable(s) are delayed, please also indicate an estimated completion date in the report text.  If the deliverable(s) include machine time, please indicate the number of days that have been used for the deliverable(s) in the report text.  For reference, the specification of this task from the PMP is given below. | | | | | | | | | | |
| **Reference from PMP:** | | | | | | | | | | |
| Modelling of global and local material migration in fusion experiments involves the benchmarking with existing experiments as well as predictive modelling for future devices. The impurity transport studies can cover intrinsically eroded material and generated dust from wall elements and also externally injected tracer and seeding species. Experiments from various devices such as tokamaks (e.g. AUG, WEST or JET-ILW), the stellarator W7-X and linear devices (MAGNUM-PSI, PSI-2, GyM) are included. Dynamic processes like surface morphology evolution or material mixing should be considered. The benchmarking should lead to a deeper understanding of the involved processes to finally improve predictive modelling of wall life time, fuel retention, and core plasma dilution. Predictive modelling can be performed e.g. for DEMO, W7-X with full tungsten.  Various codes like WallDYN, ERO2.0 can be applied to address the envisaged modelling tasks. | | | | | | | | | | |
| **Inputs required:**   * Experimental data (spectroscopy, post-mortem data with respect to erosion/deposition), to be provided by SP B, SP E, WPTE, WPW7X and AUG, WEST, JET-ILW, MAGNUM-PSI, PSI-2, GyM   Plasma background parameters (e.g. from SP D.1, WPTE, or based on experimental data provided by the various devices) | | | | | | | | | | |
| **Tasks to be performed:**   * ERO modelling of W transport in WEST in He and D (CEA) * ERO modelling of erosion, migration in GyM (ENEA) * Dynamics of morphology studies and impurity transport (ENEA) * Dynamic morphology studies, comparison with ion beam experiments (FZJ) * ERO modelling for 13CH4 injection in W7-X (FZJ) * Tungsten and beryllium, erosion, migration, deposition modelling (FZJ) * WallDYN modelling for full tungsten W7-X (MPG) * WallDYN modelling with realistic 3D ITER wall (MPG) * ERO modelling for AUG erosion experiments - H mode in He, D (VTT)   Impurity migration modelling (N, W, Be) for JET-ILW and AUG (VTT) | | | | | | | | | | |
| **Deliverables:**   |  |  | | --- | --- | | **Deliverable ID** | **Deliverable Title** | | D001 | ERO2.0 simulations of tungsten transport in WEST, determination of main tungsten sources in WEST, comparison with spectroscopy (CEA) | | D002 | ERO2.0 simulations of dynamic morphology studies in GyM, ERO2.0 simulations of the transport of sputtered material in GyM, Global ERO2.0 modelling of erosion/deposition in AUG (ENEA) | | D003 | FZJ: D3.1 Model for morphology effects and comparing modelling results with experimental ion beam data, D3.2 Local modelling of 13C MPM injection experiment and comparison to post-mortem data, D3.3 Erosion, impurity migration and deposition modelling for JET-ILW, including recessed areas (FZJ) | | D004 | D4.1 Predictive tungsten migration in W7-X, D4.2 Beryllium/tungsten migration with realistic 3D ITER first wall. (MPG) | | D005 | ERO simulations of AUG and JET-ILW erosion and migration experiments (including nitrogen, tungsten and beryllium) and comparison with experimental data (VTT) | | D006 | Dust adhesion and self-charging (VR) | | | | | | | | | | | |
| **Management Information**  **Human Resources (2022)**:   |  |  |  |  | | --- | --- | --- | --- | | **Deliverable Owner** | **Beneficiary** | **PM** | **Deliverable (Team)** | | G. Ciraolo | CEA | 2 | D001 (Y. Marandet, N. Fedorcak) | | M. Passoni | ENEA | 5 | D002 (M. Passoni, G. Alberti, A. Ucello) | | A. Kirschner | FZJ | 17 | D003 (D. Reiser, A. Kirschner, H. Xie, NN) | | K. Schmid | MPG | 2 | D004 (K. Schmid) | | A. Hakola | VTT | 4 | D005 (M. Airila, A. Hakola, M. Groth, H. Kumpulainen) | | S. Ratynskaia | VR | 3 | D006 (S. Ratynskaia, T. Panagiotis) | | **Total** |  | 33 |  |   **Machine Resources (2022):**   |  |  |  |  | | --- | --- | --- | --- | | **Device** | **Beneficiary** | **Days** | **Related Deliverable** | | n.a. |  |  |  |   **Other resources:**   * HPC requests   **Collaborations:**   * WPTE and WP W7X * ITPA DivSOL * International: LHD in Japan, PISCES in US, EAST in China   **Other information:**  Connected to TSVVs associated with WPPWIE | | | | | | | | | | |