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3-D plasma boundary and plasma wall interaction research at UW-Madison OLIVER SCHMITZ, ADRIAN AKERSON, AARON BADER, TULLIO BARBUI, FLORIAN EFFENBERG, KURT FLESCH, HEINKE FRERICHS, JONATHAN GREEN, EDWARD HINSON, THIERRY KREMEYER, RYAN NORVAL, LAURIE STEPHEY, IAN WATERS, VICTORIA WINTERS, Univ of Wisconsin, Madison — The necessity of considering 3-D effects on the plasma boundary and plasma wall interaction (PWI) in tokamaks, stellarators and reversed field pinches has been highlighted by abundant experimental and numerical results in the recent past. Prominent examples with 3-D boundary situations are numerous: ELM controlled H-modes by RMP fields in tokamaks, research on boundary plasmas and PWI in stellarators in general, quasi-helical states in RFPs, asymmetric fueling situations, and structural and wall elements which are not aligned with the magnetic guiding fields. A systematic approach is being taken at UW-Madison to establish a targeted experimental basis for identifying the most significant effects for plasma edge transport and resulting PWI in such 3-D plasma boundary situations. We deploy advanced 3-D modeling using the EMC3-EIRENE, ERO and MCI codes in combination with laboratory experiments at UW-Madison to investigate the relevance of 3-D effects in large scale devices with a concerted approach on DIII-D, NSTX-U, and Wendelstein 7-X. Highlights of experimental results from the on-site laboratory activities at UW-Madison and the large scale facilities are presented and interlinks will be discussed. - This work was supported by US DOE DE-SC0013911, DE-SC00012315 and DE-SC00014210.

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