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Contributions of Linear Plasma Devices to PMI Research

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Linear plasma devices (LPDs), sometimes called divertor simulators, bridge the gap between single effect measurements (such as ion beam sputtering measurements, or electron beam high-heat flux tests) and more complicated toroidal plasma confinement facilities. LPDs offer the opportunity to investigate the synergy and coupling between the variety of processes taking place at the interface between a material object and an incident high-energy plasma. This submission describes benefits associated with performing plasma-based research using linear plasma devices and will describe some of the key contributions (both from a plasma physics and a material science viewpoint) of the research performed in these facilities. The benefits to interpretation of measurements made in existing toroidal confinement devices by data from LPDs will be highlighted. In addition, research in LPDs aimed at future DEMO-like devices is already underway and results describing the behavior of tungsten in this environment will be described. In recent years, linear plasma devices have evolved to increase their relevance to existing machines and future fusion devices, for example by coupling of advanced diagnostics and by improving machine capabilities. In addition, their contribution to the direct support of ITER research needs showcases their importance in fusion technology development. As a consequence, linear plasma devices contribute greatly to the advancement of plasma-material interactions as a field of scientific research, to technology development for next step facilities and to the testing of advanced materials as long term solutions for future fusion reactors.

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