Physics and Design of the Divertor for ITER

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For controllable plasma conditions in the regime required for nuclear fusion, significant control of the temperature is needed. The divertor system originally implemented in the ASDEX Tokamak, allows for this control. This system also allows for optimizing the shape of the plasma with elongation and triangulation. The divertor has been implemented on many subsequent tokamaks, which have displayed a necessity for a divertor on ITER. Although the divertor has been successful on multiple systems, it needs optimization and scaling for the conditions that will be imposed by ITER. Multiple ideas have been proposed for the optimal physics and engineering of the divertor.

This project provides an overview of the important characteristics associated with the design of a divertor system, the physics associated with the divertor, experiments that have been performed with divertors, and the scaling involved for the ITER divertor system. The design of a divertor involves first physics, then engineering. The physics involves electron and ion trajectories, impurity control, flux levels, etc. The engineering involves the system shape, material, and scalability. Multiple designs of the ITER divertor have been proposed, which will be reviewed. Current divertors will be reviewed with the associated design and experiments that were performed (i.e. DIII-D, JET). Scaling experiments of the divertor for ITER will also be reviewed.

References

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