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P3.129 Characterising the impact of castellations on the efficiency of induction heating during testing in the HIVE facility

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High heat flux testing is a vital part of engineering component validation for fusion technology. The Heat by Induction to Verify Extremes (HIVE) facility is designed to improve the practicalities of this aspect of component testing. It provides a faster turnaround for smaller concepts and a more cost-effective approach by utilising induction heating within a small vacuum vessel.

Due to the potential complexity of induced current paths in an induction heating system, the amount and homogeneity of power coupled to a component is difficult to model. This uncertainty increases where components have geometrical features such as the grid pattern castellations that often feature on plasma facing components in fusion reactors.

This project investigates the influence of various castellation patterns on the coupling characteristics of HIVE. It shows for example that as the grid density of castellations is increased, the applied heat flux increases from 4.5 MW/m2 to 6.85 MW/m2 for an input power of 30kW, due to an improvement in the efficiency of the inductive coupling from 13.4% to 20.6%. Additional experimental factors affecting efficiency and homogeneity of heating are also discussed.

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