

Proposal of an arc detection strategy for the ITER ICRF antenna

S. Huygen¹, P. Dumortier¹, F. Durodié¹, A. Messiaen¹, M. Vervier¹, M. Vrancken¹, E. Wooldridge², and the CYCLE Team.

¹*ERM-KMS, Association EURATOM-Belgian State, Brussels, Belgium*

²*EURATOM/CCFE Association, Culham Science Centre, OX14 3DB Abingdon, United Kingdom*

RF arc detection is a key operational and safety issue for the ICRF system on ITER. Indeed the high voltages and electric fields inside the antenna put it at risk of arcing, which could cause substantial damage. The development of a fast and reliable arc detection system is therefore essential. Due to the 4-Port junctions inside the antenna and the decouplers and hybrid-couplers of the matching system, the standard Voltage Standing Wave Ratio (VSWR) technique is unfortunately unsuitable for protecting the antenna. Other options need to be investigated, taking into account the ITER specifications, the complexity of the whole ICRF system and the requirement to achieve load tolerance to variations in plasma loading during Edge Localised Modes (ELMs).

A Voltage Ratio Arc Detection (VRAD) combined with the monitoring of the phase of the reflected voltage appear to be a suitable solution. This paper describes the various possibilities explored by circuit simulation and the strategy now considered to protect the ITER ICRF antenna from RF arcs.