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**Mitigation of parallel RF potentials using TOPICA code**

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— The design of an Ion Cyclotron (IC) launcher is not only driven by its coupling properties, but also by its capability of maintaining low parallel electric fields, in order first to provide good power transfer to plasma and then to reduce the impurities production. However, due to the impossibility to verify the antenna performances before the starting of the operations, advanced numerical simulation tools are the only alternative to carry out reliable design. With this in mind, it should be clear that the adoption of a code, such as TOPICA [1], able to precisely take into account a realistic antenna geometry and an accurate plasma description, is extremely important to achieve these goals. Because of the recently introduced features that allow to compute the electric field and RF potential distribution everywhere inside the antenna enclosure and in the plasma column, the TOPICA code appears to be the best candidate in helping to understand which elements may have a not negligible impact on the antenna design. The present work reports a detailed analysis of antenna concepts and their further optimization in order to mitigate RF potentials; the evaluation of the effect of different plasma loadings is included as well.

[1] D. Milanesio et al., Nucl. Fusion **49**, 115019 (2009).

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