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Improvements of Partial Element Equivalent Circuit model of High-field HTS coils

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HTS coils used for high field magnets are usually made of several metal-insulated or non-insulated HTS pancakes. Quench modeling of these coils requires time-dependent simulation of current distribution inside each pancake. Partial element equivalent circuit is well-known method of modelling HTS coils, however due to large number of magnetically coupled elements, it can be time and memory consuming, which can limit the accuracy and space/time resolution of the obtained results.

This publication investigates the possibilities of improvements of PEEC method: first step is homogenization, which decreases the number of elements, after that following improvements are added : 3D finite element thermal and mechanical model, axial variation of magnetic field in each element is taken into account. This publication investigates the impact of these improvements on model accuracy and computation time.

Topic

Innovative methods and tools for modelling large-scale HTS systems

Primary author: JERANCE, Nikola (CEA Paris Saclay)

Co-authors: Mr GENOT, Clément (CEA Paris Saclay); Mr FAZILLEAU, Philippe (CEA Paris Saclay); Mr LÉCREVISSE, Thibault (CEA Paris Saclay); Mr DE CHABANNES LA PALICE, Thibault (CEA Paris Saclay)

Presenter: JERANCE, Nikola (CEA Paris Saclay)

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