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P4.093 An arc electrical simulation method for superconducting magnet system in safety-related fault condition

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In large superconducting magnet system, the release of inductive energy stored inside the superconducting coils provides a considerable potential of dc-arc hazards in case of an accident such as unmitigated quench. Safety analysis and numerical calculation have raised great concerns. This paper will present an electrical arc simulation method using Matlab/Simulink software to simulate the electrical responses with arcs presence in a 'global' circuit network. The inline arc and outline arc simulations in ITER TF electrical circuit integrated with two arc models will be adopt as examples to simulate the transient electrical behavior of TF coils and arc power during some faulty conditions. We developed the model that considered the arc length variation and arc ignition. Kronhardt model and High Pressure Arc model are compared through the simulation results. The proposed simulation method shows the convenience and efficiency of the arc electrical simulation. It can be used for further thermal damage assessment and arc detection research.

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