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Findings of simulation studies for the fast corrector magnets of PETRA IV

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Fourth-generation synchrotron radiation sources, which are currently being planned in several accelerator laboratories, require fast orbit feedback systems to correct distortions in the particle orbit in order to meet stringent stability requirements. Such feedback systems feature corrector magnets powered at frequencies up to the kilohertz range, giving rise to strong eddy currents. To understand the eddy current effects and the characteristics of these fast corrector magnets, elaborate finite element simulations must be conducted. This paper gives an overview of the most important findings of our simulation studies for the fast corrector magnets of the future synchrotron radiation source PETRA IV at DESY, Hamburg, Germany. Using a homogenization technique for the laminated yokes, we simulate the magnets over a wide frequency range.

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