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Influence of Stainless Steel Shell on the 100 T Pulsed Magnet

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The finite element analysis of electromagnetic coupling between a stainless steel shell and the 100 T pulsed magnet has been developed at the Wuhan National High Magnetic Field Center (WHMFC). The 100 T pulsed magnet consists of inner, middle and outer coil coaxially nested. The stainless steel shell is fitted tightly around the middle coil to resist the strong Lorentz force. The thickness of the stainless steel shell is 10 mm and the height is the same as the middle coil. The simulation results show that eddy current in stainless steel generated by rapidly changing magnetic field causes the peak magnetic field to drop from 102.3 T to 100.2 T, which is 2 % lower. The three coils magnet system has generated 81.4 T magnetic field, and the experimental results show that the eddy current suppression effect on the magnetic field peak is consistent with the simulation results.

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