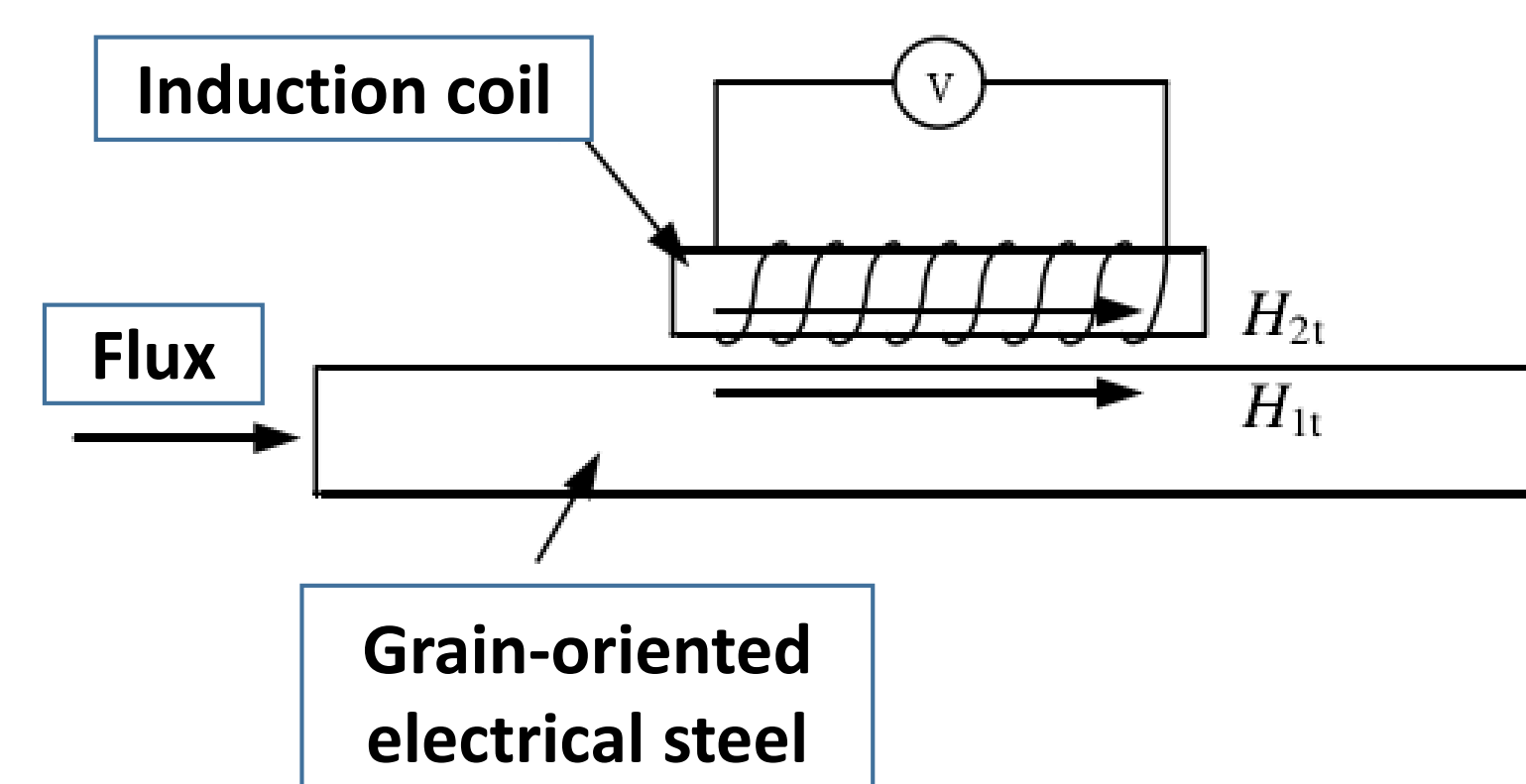
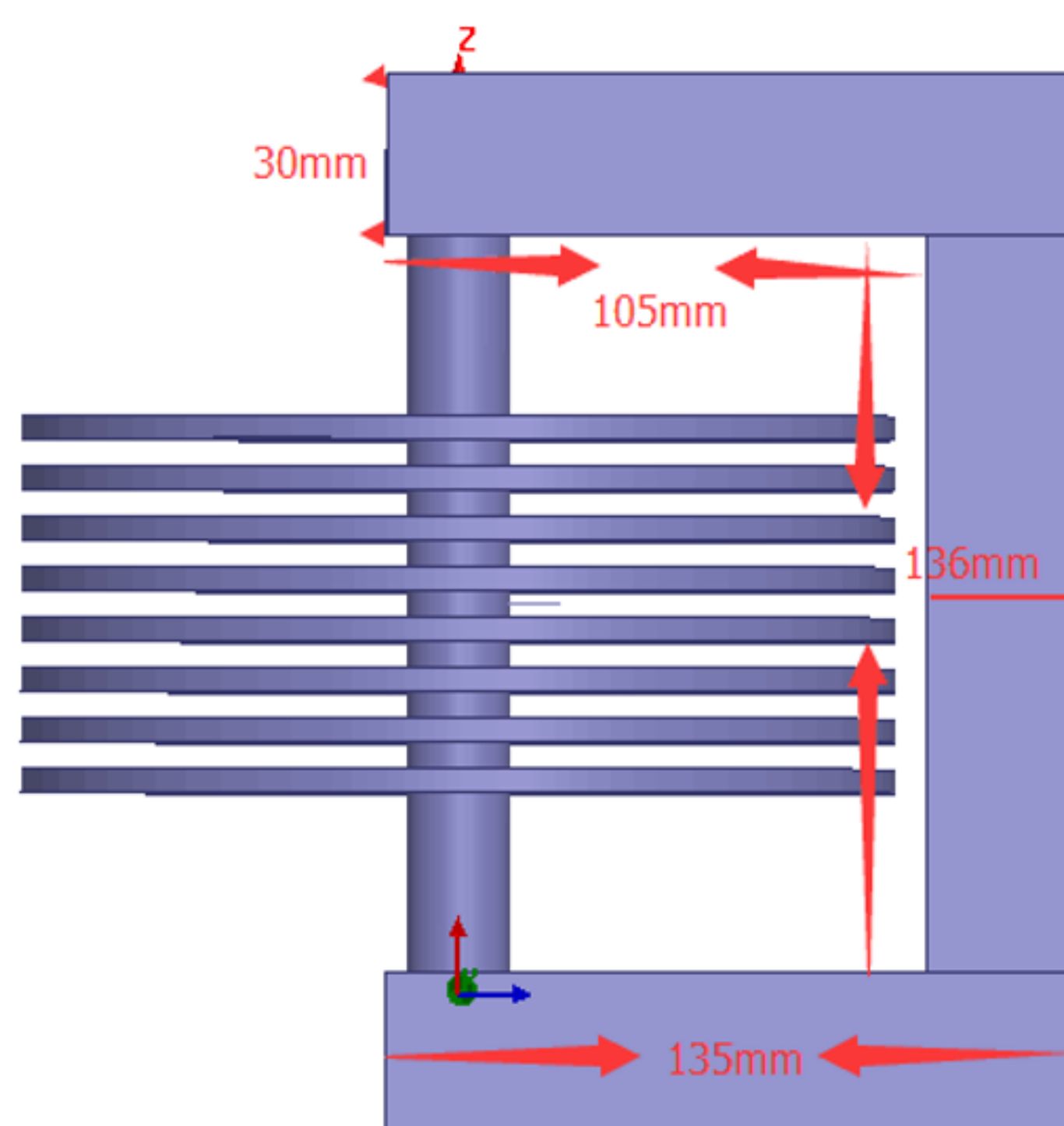
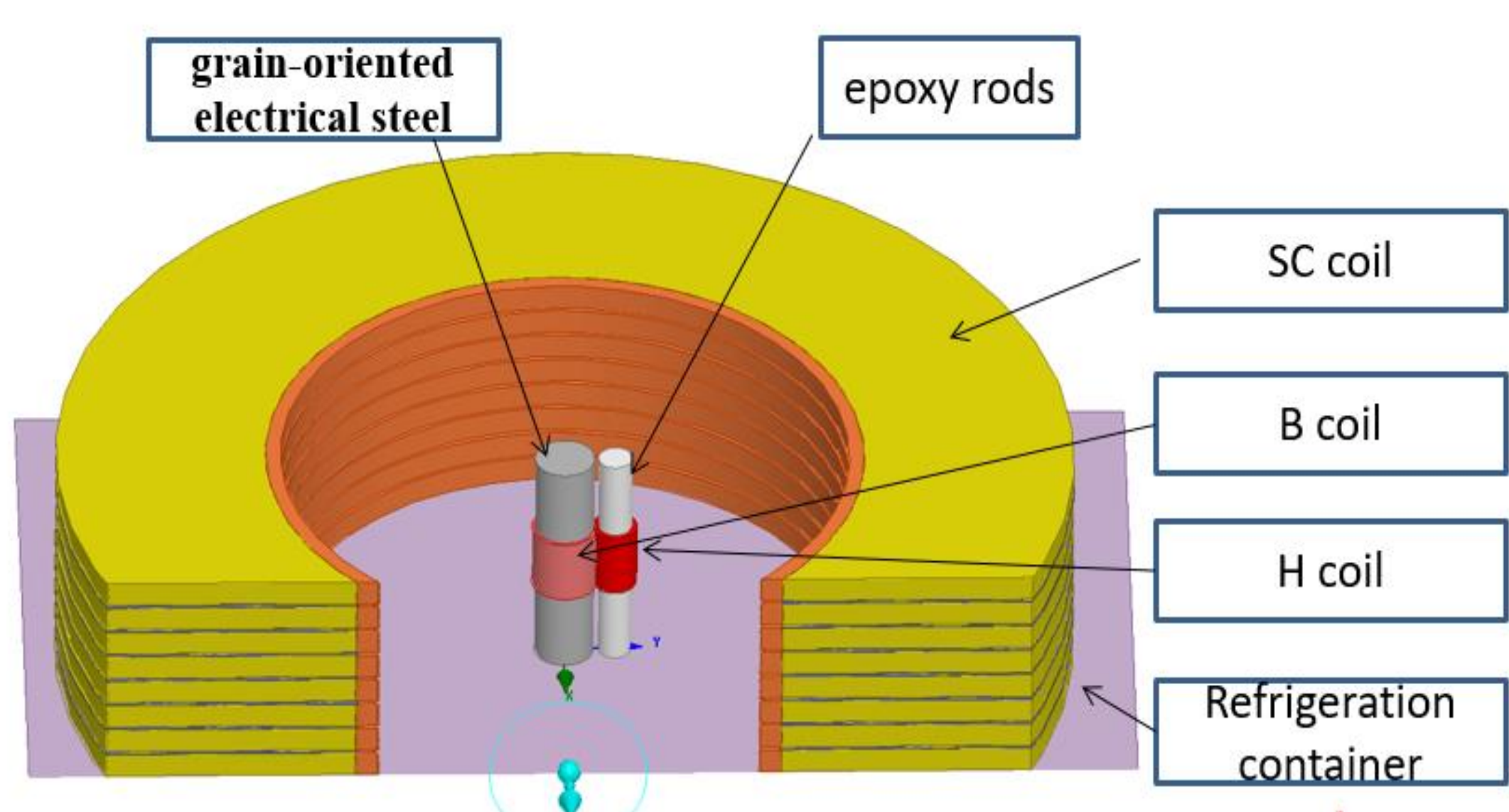
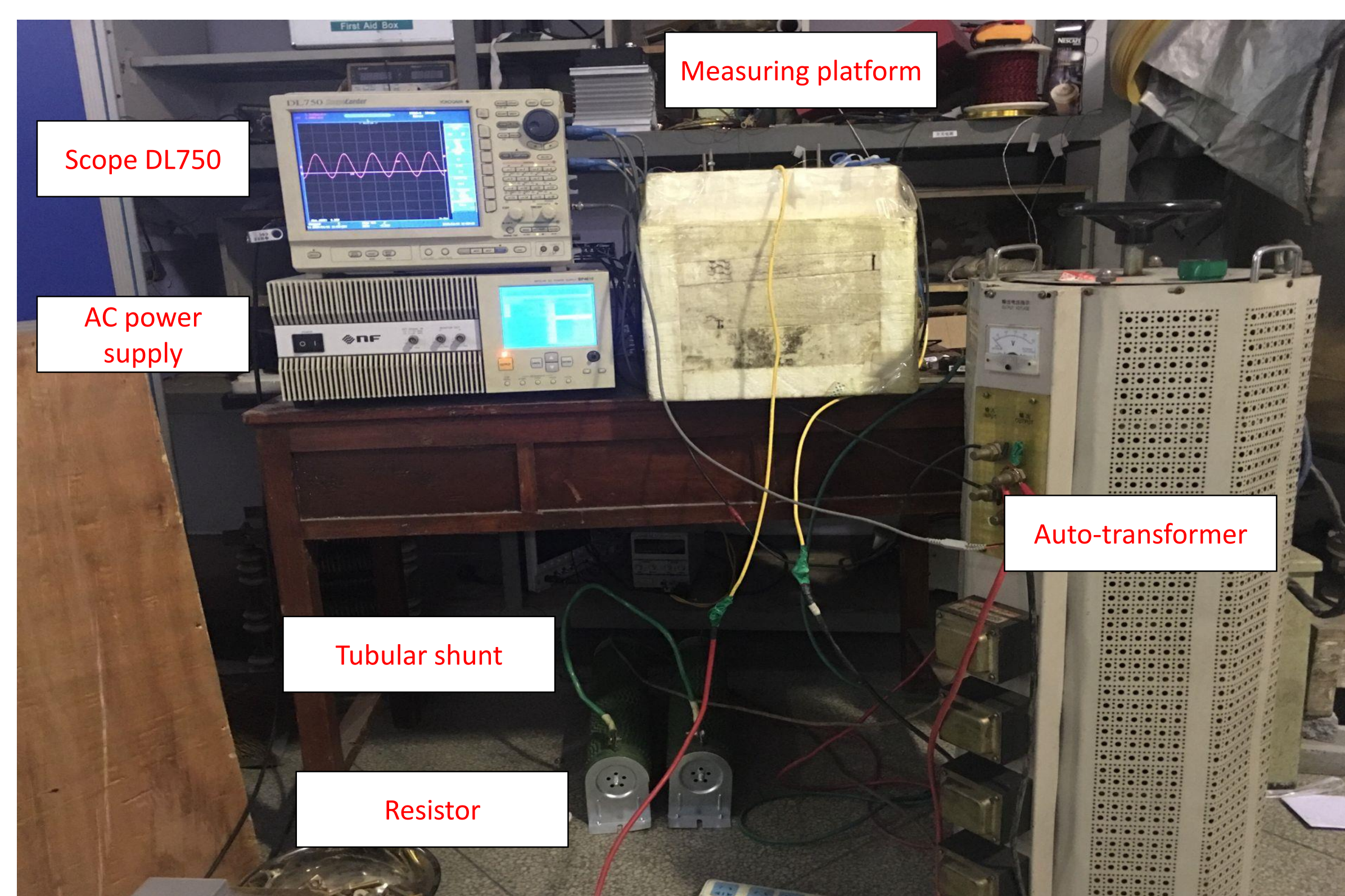
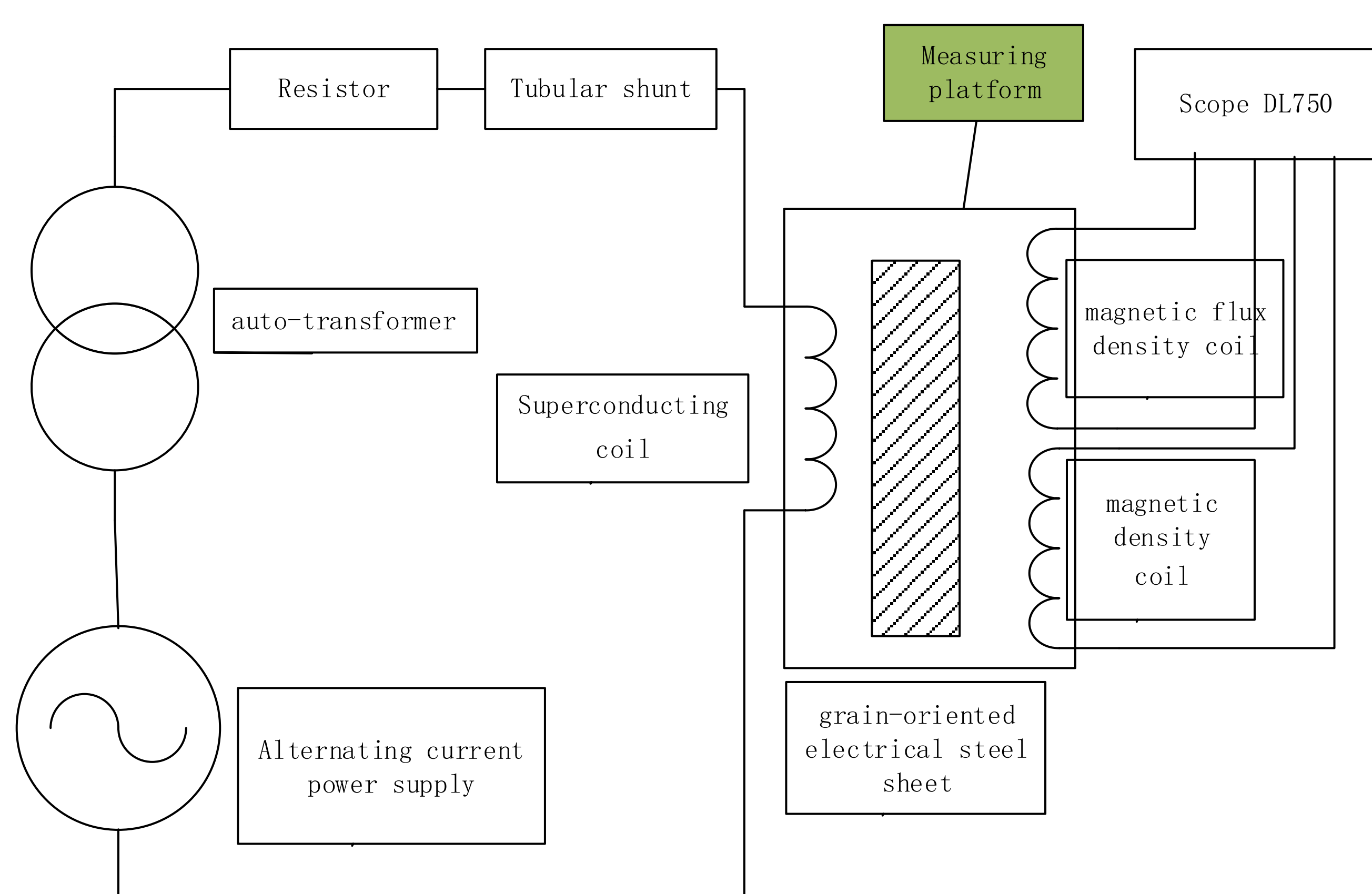


Abstract The magnetic field of iron core is excited by the interaction of both direct current (dc) and alternating current (ac) for the saturated iron-core superconducting fault current limiter (SI-SFCL), which will reach a relatively high level as 2T or above. On account of using different methods to describe the magnetic property of the iron core in deeply saturated level, the simulation results for the magnetic field and loss of iron core will be different. In which, the loss of its core and tank can reach up to a few hundred watts and influence both the transitional process and the superconducting coils. In this paper, the magnetized property of SI-SFCL under dc bias winding was investigated in detail. On the basis of experimental measurements of different magnetic properties of grain-oriented electrical steel sheet, the definition and description method of the magnetized property of iron core under dc bias was studied, the rightness of the definition was verified by using simulation analysis and experimental test. At last, the research results mentioned above were applied to analyze a 380V SI-SFCL, and the magnetic field of iron core were simulated.

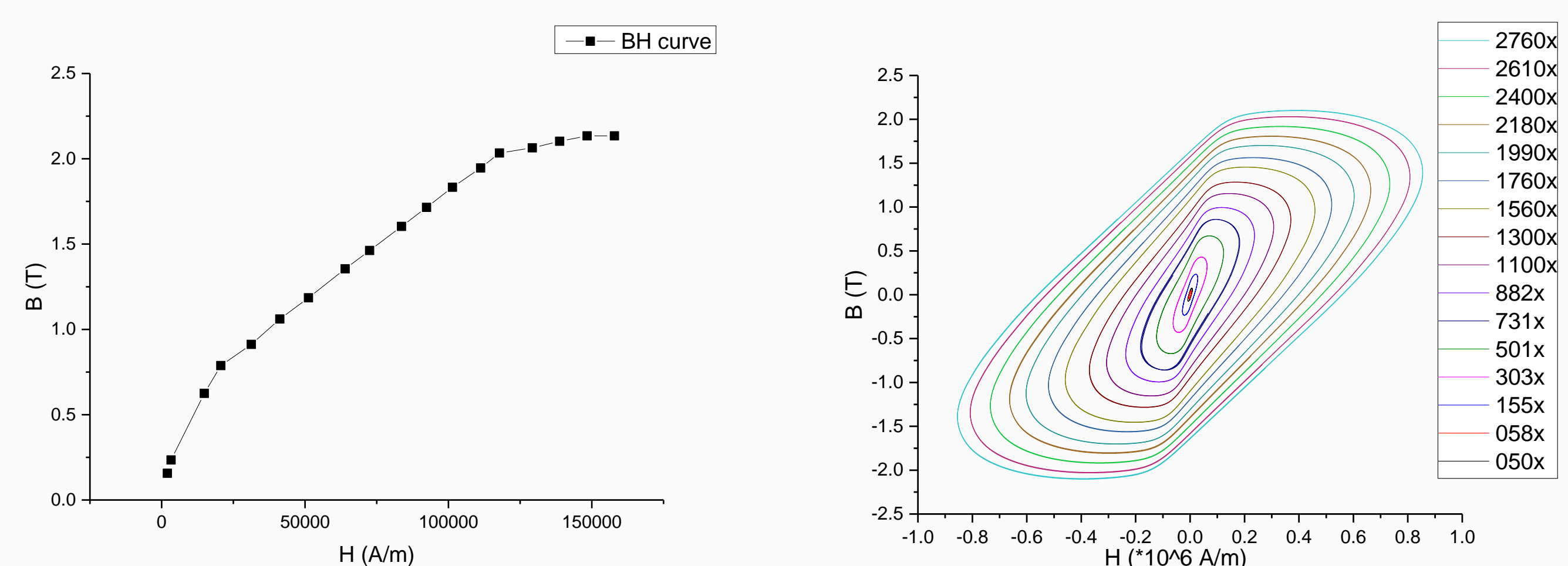
I. Introduction

Saturated Iron-core superconducting fault current limiter is a valid instrument for limiting the short circuit current and protecting the high voltage level power system, which has recently been the focus of the research in many counties. However, the crucial elements of SI-SFCL, different property of the iron core in the magnetization process has not been fully appreciated. The main magnet of the SI-SFCL has reached the saturated zone of the magnet material, which is in 2-3 T. And in that situation, the B-H curve of the material really made a great effect on the volt-ampere characteristics of the limiter. And all of the magnetic field calculation will be based on B-H curve of the magnetic materials. Therefore, the research on the magnetic property, especially the deeply magnetized situation of iron core for SI-SFCL is necessary.

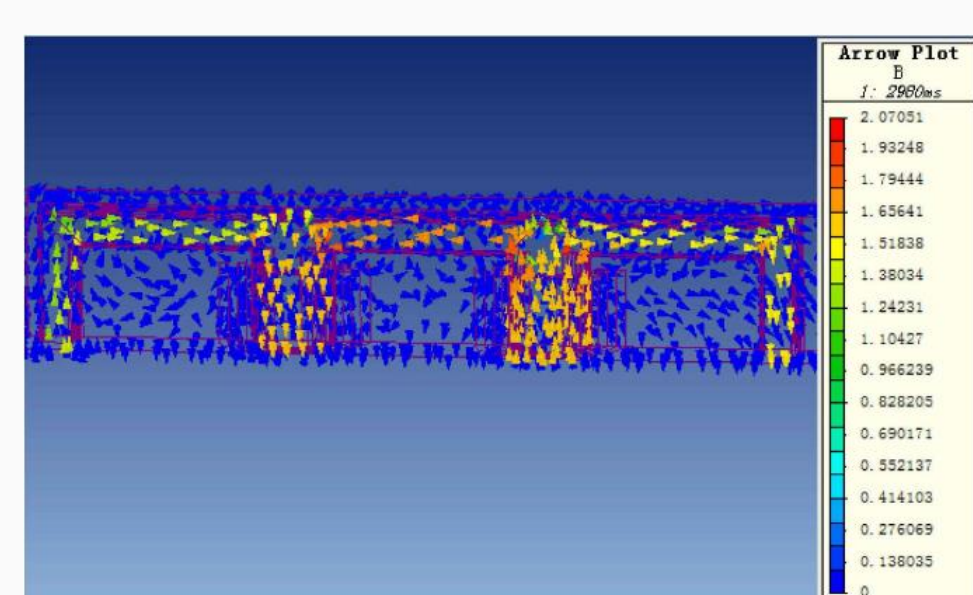
II Experiment process



IV. Simulation and Results



- Measurement of BH curve
- Measurement of hysteresis loop



- Simulation of the magnetic field distribution

V. Conclusions

This study introduced a new method to measure the magnetized property of oriented electrical steel. Through the experiment, we analyze the magnetization characteristics and hysteresis loop of silicon steel sheet in different saturation level. On the basis of experimental measurements of different magnetic properties of grain-oriented electrical steel sheet, the definition and description method of the magnetized property of iron core under dc bias was studied, the rightness of the definition was verified by using simulation analysis and experimental test. At last, the research results mentioned above were applied to analyze a 380V SI-SFCL, and we get the magnetic field of iron core by using these results.