Contribution ID: **275** Type: **Oral**

Simulation and experimental study on thermal effect of electromagnetic pulse forming

Thursday 22 June 2017 11:30 (15 minutes)

Abstract:Electromagnetic pulse formingis one of the most widely used pulse power techniques,thermal effect of electromagnetic pulse forming technology has been studied in this paper. The thermal effect is produced by the joule heat generated by the high current and the deformation of the sample in the process of electromagnetic pulse forming.The whole process is showed by simulation based on COMSOL Multiphysics, which coupling the electromagnetic field, plastic mechanics, heat transfer and thermal. The relationship between sample's parameters and the thermal effect has been analyzed by comparing different material and thickness of samples.The simulation results show that the temperature change because of the thermal effect. And a high-current pulse generator has been developed for the experiment of electromagnetic pulse forming to verify the simulation results. The high-current pulse generator has been designed and fabricated for maximum operating voltage of 25kV, peak current of 200kA.The experimental results verify that the materials and thickness affect thermal effectin the process of electromagnetic pulse forming.This work presented here extends the state of the art in the area of electromagnetic pulse forming.

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Session Classification: Oral session 19 - Numerical Modelling - Session Chair : Aled Jones

Track Classification: Pulsed Power Physics and Technology, Components and HV Insulation