



Contribution ID: 438

Type: **Oral**

Launch efficiency and muzzle velocity accuracy enhancement with a 24MJ DES railgun

Wednesday 21 June 2017 16:30 (15 minutes)

It is proved by many researchers that the distributed-energy-store (DES) railgun can provide higher launch efficiency. This paper takes a 24MJ pulsed power system and an 8.5m long railgun as the simulation example, and analyzes the launch efficiencies and muzzle velocity accuracies from DES and breech-fed railgun. 24MJ pulsed power modules consisted of 234 pulsed forming units (PFUs) are divided into five groups. And we set five energy feed-in points along the length of gun with different spacing distance. The peak current value with DES mode is 2.25MA, the residual current is 1.2MA, and the efficiency is 31.5%. While the breech-fed railgun just obtains an efficiency of 22.3%, though the peak current of 2.46MA is higher and the residual current of 0.59MA is lower. The method of increasing muzzle velocity accuracy from DES railgun is also studied in this paper. We add an energy feed-in point located in 2.5m away from gun muzzle. 20 PFUs are linked to this point. According to the armature real time velocity, PFUs of appropriate numbers are triggered and discharge energy into railgun. By this way, the dispersion of muzzle velocity are decreased from $\sim 2.5\%$ to $\sim 2.5\%$. If more energy compensation points are adopted, the muzzle velocity accuracy can be improved furthermore.

Author: Dr DAI, Ling (Huazhong University of Science and Technology)

Co-authors: Mr HU, Jinchang (Huazhong University of Science and Technology); Mr LEI, Yangqi (Huazhong University of Science and Technology); Mr LIU, Yang (Huazhong University of Science and Technology); Mr MIAO, Jianhua (Huazhong University of Science and Technology); Mr XIANG, Lingfeng (Huazhong University of Science and Technology)

Presenter: Dr DAI, Ling (Huazhong University of Science and Technology)

Session Classification: Oral session 16 - Solid State Modulators and Pulsed Magnets for Accelerators, Electromagnetic Launchers - Session Chair : Michael John Barnes

Track Classification: Pulsed Power Industrial and Bio-Medical Applications