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Power Supply Options for a Naval Railgun

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Railguns allow to accelerate military payloads to large muzzle velocities and large muzzle energies. This enables the design of range enhanced artillery systems. These systems would allow to cover target distances of more than 100 km. As modern naval ships do have electrical power generation capabilities of the order of 10s of megawatts, it is reasonable to think of electrical, heavy naval deck guns. Some preliminary parameters of such a gun were developed in recent studies [1,2]. To further investigate the electrical behavior of the proposed 25 MJ muzzle energy railgun, simulations with two different pulsed power supply units (PSU) were performed and compared. The more conventional approach uses a capacitor based PSU, the other investigated option is an inductive PSU. The simulations allow a detailed comparison of these two different approaches to meet the huge power requirements in the gigawatt scale of such a railgun. In addition the electrical aspects, aspects like safety, size, weight, cost efficiency and maintenance are of high interest for a ship-board PSU. This study will give support for the selection of the most suited pulsed power supply for a naval based railgun artillery system.

[1] S. Hundertmark, D. Lancelle, "A Scenario for a Future European Shipboard Railgun", IEEE Transactions on Plasma Science, Vol. 43, No. 5, May 2015.

[2] O. Liebfried, P. Frings, "Parameter study of an inductively powered railgun", 18th Int. Symp. Electromagn. Launch, Oct 24-28, Wuhan, China

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