

Electromagnetic Pulse Energy and Impact of EMP Environment

Md. Siyer, Shamol Chandra Barman, Md. Manik Hossain and Md. Mizanur Rahman

Mechatronics Engineering Department,
World University of Bangladesh, Dhaka
Bangladesh

mizanur.rahman@mte.wub.edu.bd

Abstract

Electronics play a crucial role in daily life, influencing everything from communication and transportation to healthcare and entertainment. As technology advances, these devices are becoming more vulnerable to electromagnetic pulses (EMPs), which can disrupt or destroy critical infrastructure such as security systems, power grids, communication networks, and financial systems. The growing threat of EMPs from natural sources, like coronal mass ejections, and man-made sources, such as nuclear explosions, increases concerns about society's vulnerability. This paper examines the potential impact of an EMP environment, focusing on how different intensity levels affect electronic systems based on the relationship between electric field strength and distance. A designed EMP generator produces controlled pulses for experiment. The findings present a formula for determining electric field strength at specific distances, with significant implications. A map is developed to visualize EMP intensity within a limited area, illustrating its spread. The analysis shows that electronics remain vulnerable to EMP effects, even with protective measures, highlighting risks in modern warfare. This paper stresses the need for public awareness and alternative solutions for electronics capable of withstanding such threats.

Keywords

Electromagnetic pulse (EMP), EMP Environment, Coronal Mass Ejection (CME), High-altitude Electromagnetic Pulse (HEMP), Electronic systems, Modern warfare