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Magnetic Field Optimization of an Augmented Rail Gun

MATTHEW CRADER, ANDY DILLS, GABRIEL FONT, United States Air Force Academy — Linear magnetic motors or rail guns are currently under study for high velocity projectile acceleration and lower velocity orbital launch applications. These systems frequently encounter problems with rail damage from the large currents required to accelerate the armature. An alternative which may be able to lower the required currents is to utilize magnetic augmentation. Multiple rail pairs are used to increase the magnetic field and diminish the current to less damaging levels. One or more pairs of rails are used to impart force to the armature while auxiliary rails are used to augment the magnetic field and increase the force. This study details an undergraduate research project to experimentally and theoretically determine the optimal combination of augmenting and accelerating rails.

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