

Abstract Submitted
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Experiments with the Electrodynamic Wheel¹ VINCENT CORDREY, IAN BEAN, OZAN DURAN, Northern Virginia Community College — A Halbach array is a system in which a series of magnets is arranged such that the magnetic field is cancelled on one side of the array while strengthening the field on the other. Based on our previous work with linear Halbach arrays, we have followed several published papers and constructed a circular Halbach with the strong magnetic field on the outer rim of the ring. Such system is usually dubbed as an Electrodynamic Wheel (EDW). Rotating the EDW around a horizontal axis above a flat conducting surface should induce eddy currents in said surface through the variable magnetic flux. The eddy currents produce, in turn, their own magnetic fields which interact with the magnets of the EDW. We demonstrated that these interactions produce both drag and lift forces on the EDW which can theoretically be used for lift and propulsion of the EDW. The focus of our experiments is determining how to maximize the lift-to-drag ratio by the proper choice of the induction element (continuous or perforated copper or aluminum strip, system of induction coils). We describe our experiments with a rotating circular Halbach array having a magnetic field of about 1 T on the outer side of the ring, and compare our results on lift/drag ratio with theoretical calculations.

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