High Voltage, Low Content: Lifters, Asymmetric Capacitors, and the Ion Wind Problem Revisited

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Abstract

Lifters, lightweight asymmetric-capacitor devices that rise off a benchtop when energized with high voltage, are a frequent hobbyist demonstration and an occasional exhibit in claims of electrogravitic propulsion. This paper argues that the phenomenon is fully explained by corona-discharge ionic wind, the same mechanism responsible for the Biefeld-Brown effect, and that the lifter's popularity as an antigravity demonstration owes entirely to its visual resemblance to levitation rather than to any ambiguity in its underlying physics, which is in fact among the best characterized electrohydrodynamic effects available to a hobbyist budget.

1 Introduction

A lifter typically consists of a thin wire acting as the positive electrode, suspended above a wider foil skirt acting as the negative electrode, connected to a high-voltage, low-current power supply. When energized to several tens of kilovolts, the assembly rises and hovers, a demonstration popularized in hobbyist electronics communities and periodically resurfacing as evidence for reactionless or gravity-defying propulsion, generally accompanied by video of the device floating with no visible propeller or exhaust.

2 Why This One Is Not Actually Ambiguous

Unlike some of the claims surveyed elsewhere in this series, the lifter is not a case of contested measurement or disputed replication. The mechanism, ionization of air at the thin wire electrode followed by acceleration of the resulting ions toward the wider skirt electrode and momentum transfer to the surrounding neutral air, has been directly visualized with schlieren photography, measured with anemometers placed beneath operating lifters, and shown to scale with voltage and electrode geometry in exactly the manner electrohydrodynamic theory predicts. The device does not work in a vacuum, a fact any hobbyist can and occasionally does verify with a bell jar and a vacuum pump, at which point the supposedly gravity-defying object sits inert on the bench, because there is no air left to ionize and push.

3 Why the Antigravity Reading Persists Anyway

The lifter's rhetorical power comes entirely from what it looks like rather than what it does. A small, light, visually simple object rising silently off a table, with no propeller, no visible jet, and no moving parts, triggers the same intuitive surprise that made the Biefeld-Brown effect compelling a century earlier, and the surprise survives contact with the correct explanation because the correct

explanation, ionized air pushing against more air, feels anticlimactic relative to the spectacle. This is a reliable pattern: demonstrations whose correct explanation is mundane but whose appearance is dramatic tend to retain their dramatic interpretation in public circulation long after the mundane explanation has been established beyond reasonable dispute in the specialist literature.

4 The Entropic Gravity Framing

On an account of gravitation as large-scale entropic and geometric bookkeeping rather than a locally sourced force, a lifter's electrostatic field has, as with the other devices surveyed in this series, no channel into gravitational curvature at all, since the field in question is a garden-variety electric field acting on ionized air molecules, several orders removed in both scale and kind from anything that could plausibly redistribute the ordered configuration gravitation tracks. The lifter requires no appeal to this framework to be explained, which is itself informative: the mundane electrohydrodynamic account is sufficient on its own terms, and reaching for a gravitational reinterpretation adds an unnecessary and unsupported layer to an already complete explanation.

5 Objections

It is occasionally argued that thrust-to-power ratios for some lifter designs exceed what simple ion-drag models predict, suggesting an additional, uncharacterized contribution. Careful measurement across a range of designs has generally traced these discrepancies to underestimated ion mobility and airflow modeling assumptions rather than to a missing physical mechanism, and no lifter has been demonstrated to produce thrust in vacuum at any efficiency, which any genuinely novel non-electrohydrodynamic mechanism would presumably still permit.

6 Conclusion

The lifter is among the more thoroughly and unambiguously explained devices in the antigravity literature, and its continued circulation as a gravity-defying demonstration says more about the gap between what an experiment looks like and what it measures than about any open question in the underlying physics.