Electrostatic Projection Couplings in Five-Dimensional Maxwell-Compatible Theory

A speculative continuation toward Brown-style electrogravity and falsifiable fifth-sector residuals

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Working paper / June 6, 2026

Status. This manuscript is a speculative mathematical prototype. It does not claim that electrogravity, anomalous capacitor thrust, or laboratory gravity control has been experimentally established. Its purpose is narrower: to define projection-coupling mechanisms that recover ordinary electrostatics and Maxwell electrodynamics in a clean limit, while making any proposed fifth-sector correction explicit enough to test and falsify.

Abstract

The companion working paper *Twelve Five-Dimensional Projection Models for Maxwell-Compatible Electromagnetism* develops a theory tree in which different five-dimensional structures reduce to ordinary four-dimensional Maxwell equations when the fifth sector decouples. This continuation asks what happens in the electrostatic limit when the fifth sector does not fully decouple. We formulate three candidate paths: a fifth-current electrostatics path, a scalar or radion readout path, and a metric-mixing path. Each path is designed to preserve ordinary Gauss-Poisson electrostatics as the zeroth-order limit while allowing a controlled residual term sourced by electrostatic field energy, field gradients, dielectric polarization, or projection curvature. We then reinterpret Brown-style asymmetric capacitor observations as a decomposition into conventional electrohydrodynamic forces plus a possible fifth-sector residual. The result is not a claim of antigravity. It is a falsifiable speculative theory template: any surviving residual must be pressure-independent, shield-compatible, momentum-conserving, geometry-sensitive in a predicted way, and bounded by modern nanonewton-scale null searches.

Contents

1 Motivation

The previous JMP0x1B working paper builds twelve five-dimensional projection models whose first requirement is Maxwell compatibility: each branch must identify an observed four-dimensional field $F_{\mu\nu}$, recover the homogeneous and sourced Maxwell equations under stated assumptions, and show which fifth-dimensional correction terms appear when those assumptions are relaxed [1]. This continuation narrows the question to electrostatics and asks whether an internally consistent path can be drawn from those correction terms toward the family of ideas historically called electrogravity.

The motivating empirical object is the Brown or Biefeld-Brown style asymmetric capacitor: a high-voltage electrode pair with different electrode geometries that experiences a force in air. Brown interpreted such effects as electrogravitic. Modern explanations usually treat the measurable force as electrohydrodynamic (EHD): ions are created in high electric field regions, accelerated through the gas, and transfer momentum to neutral air. Bahder and Fazi modeled high-voltage asymmetric capacitors and emphasized the need to separate ionic wind, ionic drift, plasma formation, gas species, pressure, voltage, and vacuum behavior [2]. NASA-sponsored work also studied asymmetric capacitors for propulsion within this conventional high-voltage context [3]. Tajmar's 2004 analysis argued that the Biefeld-Brown effect was a misinterpretation of corona wind phenomena [4]. A later high-resolution search by Tajmar, Koessling, and Neunzig found no anomalous steady-field forces or torques down to nanonewton or nanonewton-meter scale in shielded high-vacuum tests [5].

Those facts constrain the speculative task. A usable continuation should not simply relabel ion wind as gravity control. Instead, it should define a residual term that:

1. vanishes exactly in the Maxwell-compatible limit;
2. does not duplicate ordinary Maxwell stress, electrostatic attraction, heating, leakage currents, acoustic vibration, or EHD thrust;
3. remains compatible with conservation of momentum;
4. predicts a sharp difference between gas-dependent EHD and any fifth-sector residual;
5. gives experimentalists a way to kill the theory cleanly.

The guiding idea is therefore modest but fertile: electrostatic fields do not directly "bend gravity" in this model. Rather, electrostatic field energy or projection leakage sources an intermediate fifth-sector object. Gravity reads that object weakly through a scalar, an effective current, an extrinsic curvature, or a metric-mixing term. Ordinary Maxwell theory is recovered when the object decouples.

2 Projection setup

Let the five-dimensional coordinates be

$$X^A = (x^\mu, \chi), \qquad A, B = 0, 1, 2, 3, 5, \qquad \mu, \nu = 0, 1, 2, 3, \tag{1}$$

where χ denotes the fifth coordinate. The five-dimensional electromagnetic potential and field strength are

$$\mathcal{A}_A = (A_\mu, A_5), \qquad \mathcal{F}_{AB} = \partial_A \mathcal{A}_B - \partial_B \mathcal{A}_A. \tag{2}$$

The observed four-dimensional electromagnetic field is the projected component

$$F_{\mu\nu}(x) = \mathcal{F}_{\mu\nu}(x, \chi_0), \tag{3}$$

while the mixed components are collected as

$$\Pi_\mu(x) = \mathcal{F}_{\mu 5}(x, \chi_0) = \partial_\mu A_5 - \partial_5 A_\mu. \tag{4}$$

The previous paper's Maxwell-compatible limit can be represented abstractly as

$$\Pi_\mu \to 0, \qquad \partial_5 F_{\mu\nu} \to 0, \qquad \mathcal{G}_{AB} \to \mathcal{G}^{(0)}_{AB}, \tag{5}$$

where $\mathcal{G}^{(0)}_{AB}$ is a projection geometry that introduces no surviving fifth-sector current in four dimensions.

A generic five-dimensional sourced equation has the form

$$\nabla_A \mathcal{F}^{AB} = \mu_5 \mathcal{J}^B. \tag{6}$$

Projecting the $B = \nu$ component onto the four-dimensional sheet gives

$$\nabla_\mu F^{\mu\nu} = \mu_0 J^\nu + \mu_0 J^\nu_5, \tag{7}$$

where J^ν is the ordinary current and J^ν_5 is a projection current. For a flat product geometry this can be sketched as

$$J^\nu_5 \sim -\frac{1}{\mu_0} \partial_5 \Pi^\nu, \tag{8}$$

while a general projection can also contain connection, extrinsic curvature, radion, or density-sheet terms:

$$J^\nu_5 = -\frac{1}{\mu_0} \left(\mathcal{D}_5 \Pi^\nu + C^\nu[F, \Pi, \mathcal{G}, K, \phi] \right). \tag{9}$$

Here K denotes projection curvature and ϕ denotes a scalar measuring the size, stiffness, or permeability of the fifth direction. Equation (7) is the basic bridge from the twelve-branch framework to electrostatics.

3 Electrostatic reduction

In electrostatics,

$$\mathbf{B} = 0, \qquad \mathbf{E} = -\nabla \Phi, \qquad \partial_t \mathbf{E} = 0. \tag{10}$$

The standard Maxwell limit gives Gauss-Poisson theory,

$$\nabla \cdot \mathbf{E} = \frac{\rho}{\epsilon_0}, \qquad \nabla^2 \Phi = -\frac{\rho}{\epsilon_0}. \tag{11}$$

The projected equation (7) modifies Gauss law to

$$\nabla \cdot \mathbf{E} = \frac{\rho + \rho_5}{\epsilon_0}, \tag{12}$$

where $\rho_5 = J^0_5 / c$ in units where the time component is normalized consistently. Equivalently,

$$\nabla^2 \Phi = -\frac{\rho + \rho_5}{\epsilon_0}. \tag{13}$$

This is the simplest electrostatic connection: a fifth-sector leakage appears as an effective charge density. The theory is Maxwell-compatible only if

$$\rho_5 = 0 \tag{14}$$

under ordinary laboratory conditions, or is so small that it lies below present constraints.

A useful weak-field parameterization is

$$\rho_5 = \epsilon_0 \left[a_1 \partial_5 \Pi_0 + a_2 \nabla s \cdot \mathbf{E} + a_3 K_i E^i + a_4 \ell^2 \nabla^2 (\nabla \cdot \mathbf{E}) \right], \tag{15}$$

where s is a scalar fifth-sector field, K_i is an effective projection-curvature vector, ℓ is a characteristic fifth-sector length scale, and a_i are phenomenological couplings. The terms in (15) have different experimental meanings:

- $\partial_5 \Pi_0$ means direct leakage along the fifth coordinate.
- $\nabla s \cdot \mathbf{E}$ means electrostatics is modified by gradients of a scalar projection medium.
- $K_i E^i$ means an extrinsic geometric tilt converts electric flux into projected charge.
- $\ell^2 \nabla^2 (\nabla \cdot \mathbf{E})$ means sharp electrode curvature can produce small higher-gradient corrections.

The Brown-style geometry becomes interesting because asymmetric capacitors maximize sharp gradients, dielectric boundary layers, and electrode curvature. In this model, those features are not automatically antigravity. They are potential amplifiers of ρ_5 or s.

4 Three speculative paths

4.1 Path A: fifth-current electrostatics

The first path treats the fifth sector as a hidden charge reservoir. Ordinary charge conservation becomes

$$\nabla_\mu J^\mu = -\nabla_\mu J_5^\mu. \tag{16}$$

If the total five-dimensional current is conserved, this is not a violation of conservation. It is a statement that four-dimensional charge can appear nonconserved if current flows through the projection boundary. In a stable electrostatic device this should normally average to zero. A residual appears only if the electrode-dielectric system has a persistent fifth-sector polarization:

$$\rho_5 = -\nabla \cdot \mathbf{P}_5, \qquad \mathbf{P}_5 = \epsilon_0\, \eta_P\, s\mathbf{E} + \epsilon_0\, \eta_K\, \ell K \mathbf{E}. \tag{17}$$

Then Gauss law becomes

$$\nabla \cdot [\epsilon_0 (1 + \eta_P s) \mathbf{E}] = \rho + \epsilon_0 \eta_K \nabla \cdot (\ell K \mathbf{E}). \tag{18}$$

This is experimentally close to a nonlinear dielectric law. Its clean signatures are not thrust, but anomalous capacitance, field-dependent dielectric relaxation, and geometry-sensitive electrostatic shielding residuals.

4.2 Path B: scalar or radion readout of electrostatic energy

The second path introduces a scalar s representing the local size, tension, phase stiffness, or permeability of the fifth dimension. A minimal effective Lagrangian is

$$\mathcal{L} = -\frac{1}{4\mu_0} Z(s) F_{\mu\nu} F^{\mu\nu} - \frac{1}{2} \partial_\mu s \partial^\mu s - V(s) + \mathcal{L}_{\text{matter}}, \tag{19}$$

with

$$Z(s) = 1 + \eta s + O(s^2). \tag{20}$$

Varying (19) gives

$$\nabla_\mu \left[Z(s) F^{\mu\nu} \right] = \mu_0 J^\nu, \tag{21}$$

$$\Box s - V'(s) = \frac{1}{4\mu_0} Z'(s) F_{\mu\nu} F^{\mu\nu}. \tag{22}$$

For static electric fields with $\mathbf{B} = 0$, the field invariant is proportional to $-E^2$ up to sign convention. Thus electrostatic field energy sources s:

$$(\nabla^2 - m_s^2) s = -\alpha_E u_E, \qquad u_E = \frac{1}{2}\epsilon_0 E^2, \tag{23}$$

where m_s is an inverse range and α_E is a phenomenological coupling with dimensions chosen so that s is dimensionless.

To turn this into a speculative electrogravity model, assume the weak gravitational potential reads s through

$$\delta\Phi_g = \frac{1}{2}\gamma_s c^2 s, \qquad \delta\mathbf{g} = -\nabla\delta\Phi_g = -\frac{1}{2}\gamma_s c^2 \nabla s. \tag{24}$$

Equations (23) and (24) provide a concrete version of "electrostatic gravity modification": electrostatic energy sources s, and s perturbs the effective gravitational potential. The model reduces to ordinary electrostatics and ordinary gravity when $\alpha_E \gamma_s \to 0$, $m_s \to \infty$, or $s \to 0$.

The solution of (23) is approximately

$$s(\mathbf{x}) = \alpha_E \int \frac{e^{-m_s|\mathbf{x}-\mathbf{x}'|}}{4\pi|\mathbf{x}-\mathbf{x}'|} u_E(\mathbf{x}') \, \mathrm{d}^3x'. \tag{25}$$

A highly asymmetric capacitor can create a strongly asymmetric $u_E(\mathbf{x})$. That asymmetry creates an asymmetric $s(\mathbf{x})$. However, by itself, a closed isolated device still cannot produce reactionless self-acceleration if the Lagrangian is local and translationally invariant. A net force requires exchange with an environment: Earth, a boundary condition in s, a background fifth-sector gradient, radiation, leakage current, gas, or support structure.

This point is crucial. The path is closer to weight modulation than free propulsion. A laboratory force would be modeled as

$$\mathbf{F}_{5D} = \int_V \rho_m(\mathbf{x}) \, \delta\mathbf{g}(\mathbf{x}) \, \mathrm{d}^3x + \int_V u_E(\mathbf{x}) \, \nabla\Gamma_\oplus(\mathbf{x}) \, \mathrm{d}^3x + \mathbf{F}_{\text{boundary}}, \tag{26}$$

where ρ_m is the device mass density, $\Gamma_\oplus$ represents possible Earth/background coupling, and $\mathbf{F}_{\text{boundary}}$ accounts for momentum exchanged through the fifth-sector boundary. If all three integrals reduce to internal self-stresses, the net external force must vanish.

4.3 Path C: metric mixing and Kaluza-style charge geometry

In Kaluza-Klein style theories, the electromagnetic vector potential can be encoded in off-diagonal metric components. A schematic metric ansatz is

$$\mathrm{d}S^2 = g_{\mu\nu}\mathrm{d}x^\mu \mathrm{d}x^\nu + \phi^2(\mathrm{d}\chi + kA_\mu \mathrm{d}x^\mu)^2. \tag{27}$$

This type of construction historically motivates the idea that electromagnetism and gravity can be different projections of a higher-dimensional geometry [7, 8]. In the strict Maxwell-compatible limit, the four-dimensional equations reduce to ordinary Einstein-Maxwell behavior. When ϕ, $\partial_5 A_\mu$, or the projection hypersurface becomes dynamical, additional terms appear.

For electrostatics $A_\mu = (\Phi/c, 0, 0, 0)$, the mixed metric component g_{05} carries electrostatic potential. A geodesic projected into four dimensions can acquire terms of the schematic form

$$\frac{\mathrm{d}^2 x^i}{\mathrm{d}\tau^2} = \frac{q}{m} F^i{}_\nu u^\nu + b_1(\partial^i \phi)(u^5)^2 + b_2 \partial_5 F^i{}_\nu u^\nu u^5 + b_3 K^i{}_{\mu\nu} u^\mu u^\nu. \tag{28}$$

The first term is the Lorentz force. The remaining terms are speculative projection forces. A Brown-like device could then be treated as a generator of large $\partial_i \Phi$, large field-gradient curvature, and strong dielectric polarization, all of which might alter ϕ or K.

This path is mathematically attractive because it links directly to branch T_g (full metric dynamic theory), branch T_5 (compact fifth-dimension theory), branch T_q (charge-fiber theory), and branch T_F (fifth-force conversion theory) in the earlier theory tree. Its weakness is that Kaluza-style electromagnetic-gravitational couplings are normally far too small to produce dramatic laboratory effects unless new coupling scales are introduced. Therefore the model must be framed as a constrained phenomenology, not a claim of established high-power gravity control.

5 Brown-style capacitor decomposition

A disciplined continuation should write any measured force on a high-voltage asymmetric capacitor as

$$\mathbf{F}_{\text{obs}} = \mathbf{F}_{\text{EHD}} + \mathbf{F}_{\text{Maxwell}} + \mathbf{F}_{\text{thermal}} + \mathbf{F}_{\text{leak}} + \mathbf{F}_{\text{vibration}} + \mathbf{F}_{5D}. \tag{29}$$

The conventional terms are not nuisance details. They are the dominant expected physics. The speculative theory only lives in $\mathbf{F}_{5D}$ after the others are bounded or subtracted.

A minimal Brown-compatible fifth-sector residual can be written as

$$\mathbf{F}_{5D} = \zeta_1 \int_V u_E \, \nabla s_0 \, \mathrm{d}^3x + \zeta_2 \int_V s \, \nabla u_E \, \mathrm{d}^3x + \zeta_3 \int_V u_E \, \mathbf{K} \, \mathrm{d}^3x + \zeta_4 \int_{\partial V} u_E \, \mathbf{n}_5 \, \mathrm{d}A. \tag{30}$$

Here s_0 is an ambient fifth-sector scalar background, $\mathbf{K}$ is projection curvature, $\mathbf{n}_5$ is a boundary normal into the fifth sector, and the ζ_i are phenomenological couplings. This is intentionally broad. Its purpose is to expose where momentum goes:

- the ζ_1 term exchanges momentum with a background gradient;
- the ζ_2 term exchanges momentum between field energy and the scalar sector;
- the ζ_3 term exchanges momentum with projection curvature;
- the ζ_4 term exchanges momentum through a fifth-boundary flux.

If all backgrounds and boundaries vanish, (30) should integrate to zero for a closed system.

6 Predicted signatures

The purpose of this paper is to create testable theory paths. The following signatures separate the proposed fifth-sector residual from known high-voltage artifacts.

The sharpest prediction comes from pressure scaling. If a force falls with gas density, tracks corona current, changes with gas species, or disappears when ion transport is eliminated, it belongs in $\mathbf{F}_{\text{EHD}}$. If a residual persists in shielded high vacuum, it must then satisfy orientation, polarity, and symmetry tests before it can be treated as a candidate $\mathbf{F}_{5D}$.

Signature	Conventional EHD expectation	Fifth-sector residual expectation
Gas pressure	Strong dependence on pressure, gas species, corona onset, and ion mobility	Ideally pressure-independent after leakage, outgassing, and discharge are suppressed
Polarity	Often polarity-sensitive because corona and ion species differ by electrode sign	Scalar E^2 couplings are polarity-even; direct fifth-current terms may be polarity-odd
Symmetric capacitor	Maxwell stress is internal; no net thrust in a closed balanced setup	Should vanish unless external background or fifth-boundary term is present
Orientation to Earth	Ordinary EHD follows device geometry and gas flow	Weight-modulation path may change under 180-degree inversion relative to local $\mathbf{g}$
Dielectric response	Tracks leakage, heating, permittivity, and breakdown behavior	May show delayed relaxation if s couples to polarization or density-sheet variables
Shielding	Faraday shielding removes external electric fields but not internal ion wind unless sealed	A confined field could still source s; external readout would be a key anomaly
Vacuum	EHD should collapse when gas transport is removed	Any real electrogravity residual must survive clean high vacuum within measurement bounds

Table 1: Qualitative separation between conventional electrohydrodynamic forces and the speculative fifth-sector residual.

7 Minimal experimental protocol

A speculative paper should make itself easy to falsify. The following protocol is a theory-driven null test rather than a claim of expected success.

1. **Force budget first.** Measure voltage, current, electrode temperature, acoustic vibration, leakage paths, corona luminosity, ozone or ion production, and support-wire electrostatic forces.
2. **Pressure ladder.** Repeat from atmospheric pressure to high vacuum. Fit the force to gas-dependent EHD models before looking for residuals.
3. **Geometry pair.** Test an asymmetric capacitor and a symmetric capacitor with matched capacitance, stored energy, mass, dielectric, and leakage.
4. **Polarity pair.** Reverse polarity at fixed E^2. A scalar energy path predicts even behavior; a charge-fiber path may predict odd behavior.
5. **Earth orientation.** Rotate the sealed device by 180 degrees relative to local gravity. A weight-modulation interpretation must define the sign change or null result in advance.
6. **Internal-field shielding.** Confine the high electric field inside a sealed Faraday enclosure mechanically isolated from the balance. Any external force must not be explainable by cable forces or field leakage.
7. **Null coupling bound.** If no residual is observed, report an upper bound on the combined parameter products, such as $|\alpha_E \gamma_s|$ or $|\zeta_i|$.

A useful reporting equation is

$$|\mathbf{F}_{5D}| < |\mathbf{F}_{\text{obs}} - \mathbf{F}_{\text{EHD}} - \mathbf{F}_{\text{Maxwell}} - \mathbf{F}_{\text{thermal}} - \mathbf{F}_{\text{leak}} - \mathbf{F}_{\text{vibration}}| + \sigma_F. \tag{31}$$

This turns a failed experiment into a publishable constraint.

8 Connection to the twelve branches

The electrostatic continuation does not need all twelve branches equally. The most relevant are summarized below.

Branch	Electrostatic role	Possible electrogravity role
T_0 **static projection**	Defines the exact Maxwell/Gauss recovery limit	Baseline null theory; all residuals vanish
T_m **mass-coordinate**	Lets charge/mass ratios become projection variables	Couples electrostatic energy to inertial or gravitational response
T_ρ **density sheet**	Treats matter density as a fifth-sheet coordinate	Dielectric density gradients become projection sources
T_E **energy-coordinate**	Makes field energy a natural fifth coordinate	Electrostatic energy u_E can source scalar readout
T_5 **compact dimension**	Supports Kaluza-style metric ansatz	Charge as fifth momentum; residuals from noncompact leakage
T_θ **phase-action**	Links phase stiffness to potential	High-voltage phase gradients as scalar sources
T_q **charge fiber**	Gives charge a fiber coordinate	Effective fifth charge density ρ_5
T_R **scale flow**	Permits scale-dependent coupling	Field-dependent capacitance and local G_{eff} shifts
T_g **full metric dynamic**	Promotes projection geometry to dynamics	Metric mixing, radion coupling, gravitational readout
T_C **constraint surface**	Enforces Maxwell as a hypersurface condition	Anomalies are constraint violations or boundary flux
T_F **fifth-force conversion**	Allows fifth-sector force to project into 4D	Direct candidate for Brown-style residual

Table 2: How the electrostatic/electrogravity continuation maps onto branches of the earlier five-dimensional theory tree.

The key design rule is the same as in the earlier paper: every branch must state its Maxwell-recovery condition. For the present continuation, the recovery condition is stronger:

$$\rho_5 = 0, \qquad s = 0, \qquad \nabla s = 0, \qquad K_i E^i = 0, \qquad \mathbf{F}_{5D} = 0. \tag{32}$$

Only when one of these assumptions is deliberately relaxed may a new electrostatic or electrogravity term appear.

9 A compact toy model

For future papers, the cleanest single model is the scalar readout path. Define

$$\nabla \cdot [Z(s)\mathbf{E}] = \frac{\rho}{\epsilon_0}, \tag{33}$$

$$\nabla \times \mathbf{E} = 0, \tag{34}$$

$$(\nabla^2 - m_s^2)s = -\alpha_E \frac{\epsilon_0 E^2}{2}, \tag{35}$$

$$\delta \mathbf{g} = -\frac{1}{2}\gamma_s c^2 \nabla s. \tag{36}$$

With $Z(s) = 1 + \eta s$, the modified Poisson equation is

$$\nabla^2 \Phi = -\frac{\rho}{\epsilon_0} - \eta \nabla s \cdot \nabla \Phi + O(s^2). \tag{37}$$

The scalar solution is the Yukawa convolution (25). The anomalous acceleration at a point is

$$\delta \mathbf{g}(\mathbf{x}) = -\frac{1}{2}\gamma_s c^2 \alpha_E \nabla \int \frac{e^{-m_s|\mathbf{x}-\mathbf{x}'|}}{4\pi|\mathbf{x}-\mathbf{x}'|}\, u_E(\mathbf{x}')\, \mathrm{d}^3x'. \tag{38}$$

For a capacitor with electrode gap d, characteristic field $E_0 = V/d$, and active volume V_c, the magnitude scales roughly as

$$|\delta g| \sim \frac{1}{2}|\gamma_s \alpha_E| c^2\, \frac{\epsilon_0 E_0^2}{2}\, L_{\mathrm{asym}}\, \mathcal{Y}(m_s L), \tag{39}$$

where L_{asym} encodes the geometry-dependent gradient of field energy and $\mathcal{Y}$ is a Yukawa range factor. Equation (39) is deliberately phenomenological. It gives experimentalists a parameter product to bound without pretending to know the microscopic fifth-sector scale.

The toy model makes three immediate statements:

1. A parallel-plate capacitor with uniform field has little external gradient in u_E and should produce no net force except tiny field-energy weight in standard general relativity.
2. A sharp asymmetric capacitor can maximize ∇u_E, but in air this also maximizes corona and EHD, so it is the worst geometry for a clean anomaly search unless operated below discharge in high vacuum.
3. If a residual exists, its leading scalar component is voltage-even because it depends on E^2. Polarity-odd residuals point to direct charge-fiber leakage, leakage currents, ion chemistry, or instrumentation error.

10 Paper program

This continuation naturally splits into three publishable papers.

Paper I: Electrostatic projection couplings

This manuscript. Goal: define ρ_5, s, K_i, and the Maxwell-compatible electrostatic limit. Deliverable: modified Gauss law, scalar readout equation, and falsification protocol.

Paper II: Radion-weighted electrogravity

Goal: promote the scalar model to a covariant action with gravity,

$$S = \int \sqrt{-g} \left[\frac{1}{2\kappa} R - \frac{1}{4\mu_0} Z(s) F^2 - \frac{1}{2} (\partial s)^2 - V(s) + \mathcal{L}_m(A, g, s) \right] \mathrm{d}^4 x. \tag{40}$$

Deliverable: stress-energy tensor, weak-field limit, predicted bounds on $\alpha_E \gamma_s$, and relation to Einstein-Maxwell theory.

Paper III: Brown devices as residual tests

Goal: write a complete experimental force budget for asymmetric capacitors. Deliverable: pressure-scaling models, polarity/orientation tables, null-result parameter bounds, and a standard reporting template for research.jmp0x1b.com.

11 Conclusion

The speculative bridge from five-dimensional Maxwell-compatible projections to electrogravity should be built in layers. The first layer is ordinary electrostatics. The second is a fifth-sector correction such as ρ_5, s, or K_i. The third is a gravitational readout of that correction. The fourth is a carefully controlled Brown-style force budget in which ion wind and all conventional forces are removed before any residual is named.

This framing keeps the theory imaginative but disciplined. It allows the phrase "gravity modified by electromagnetism" to mean something precise: electrostatic field energy or projection leakage sources a fifth-sector degree of freedom, and that degree of freedom weakly perturbs gravitational response. If the fifth sector decouples, Maxwell and ordinary gravity return exactly. If it does not decouple, the theory predicts specific residuals that can be searched for and bounded.

A Notation summary

Symbol	Meaning
χ	Fifth coordinate
$\mathcal{A}_A$	Five-dimensional electromagnetic potential
$\mathcal{F}_{AB}$	Five-dimensional field strength
$F_{\mu\nu}$	Observed four-dimensional electromagnetic field
Π_μ	Mixed fifth-field component $\mathcal{F}_{\mu 5}$
J_5^μ	Effective projected fifth current
ρ_5	Effective fifth charge density in modified Gauss law
s	Scalar fifth-sector/radion/projection-medium field
K_i	Effective projection-curvature vector
u_E	Electrostatic field energy density $\epsilon_0 E^2/2$
$\delta\Phi_g$	Fifth-sector perturbation to gravitational potential
$\delta\mathbf{g}$	Fifth-sector perturbation to local gravitational acceleration

B Internal consistency checklist

Before any future version claims a physical effect, the following must be satisfied.

1. **Maxwell recovery:** $\rho_5 = 0$ and $Z(s) = 1$ under ordinary conditions.
2. **Gauge consistency:** the projected equations must remain invariant under $A_\mu \mapsto A_\mu + \partial_\mu \Lambda$ unless a controlled symmetry-breaking term is explicitly introduced.
3. **Momentum accounting:** any net force must identify the external field, boundary, radiation, gas, or fifth-sector channel carrying opposite momentum.
4. **Equivalence-principle accounting:** if s changes gravitational response, the model must say whether it couples to all mass-energy universally or only to electromagnetic/dielectric sectors.
5. **Null-result survival:** modern vacuum null tests must be translatable into upper bounds on the couplings.
6. **Experimental separability:** a proposed residual must differ from EHD in pressure, polarity, orientation, shielding, and scaling.

References

[1] JMP0x1B Research Lab. *Twelve Five-Dimensional Projection Models for Maxwell-Compatible Electromagnetism*. Working paper, June 3, 2026. https://research.jmp0x1b.com/papers/twelve-5d-projection-electromagnetism.html

[2] Thomas B. Bahder and Chris Fazi. *Force on an Asymmetric Capacitor*. arXiv:physics/0211001, 2002. https://arxiv.org/abs/physics/0211001

[3] Francis X. Canning, Cory Melcher, and Edwin Winet. *Asymmetrical Capacitors for Propulsion*. NASA Contractor Report NASA/CR-2004-213312, 2004.

[4] Martin Tajmar. *Biefeld-Brown Effect: Misinterpretation of Corona Wind Phenomena*. AIAA Journal, 42(2):315–318, 2004.

[5] Martin Tajmar, Matthias Koessling, and Oliver Neunzig. *In-Depth Search for a Coupling between Gravity and Electromagnetism with Steady Fields*. arXiv:2402.15640, 2024. https://arxiv.org/abs/2402.15640

[6] Reuven Ianconescu, Daniela Sohar, and Moshe Mudrik. *An analysis of the Brown-Biefeld effect*. arXiv:1011.1393, 2010. https://arxiv.org/abs/1011.1393

[7] Stephane Collion and Michel Vaugon. *A new approach to Kaluza-Klein Theory*. arXiv:1709.04172, 2017. https://arxiv.org/abs/1709.04172

[8] Tomas Liko. *Induced current and redefinition of electric and magnetic fields from non-compact Kaluza-Klein theory: An experimental signature of the fifth dimension*. arXiv:hep-th/0505049, 2005. https://arxiv.org/abs/hep-th/0505049