Gauge-Consistent Effective Operators for Five-Dimensional Projection Electromagnetism

A Speculative Operator Basis for Auditable Spacefaring Anomaly Research

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Abstract. This paper converts the JMP0X1B five-dimensional projection program into an effective-operator language suitable for anomaly testing. The central object is not a vehicle or a force claim. It is a four-dimensional correction current, denoted J^{ν}_{new}, that may appear when a speculative fifth-sector construction is projected onto ordinary spacetime. We impose three filters: exact Maxwell recovery in a decoupling limit, local gauge consistency, and closed-system charge conservation. Under those filters, many speculative narratives collapse into a smaller set of admissible four-dimensional constitutive archetypes: scalar-energy weighting, fifth-gradient flow, projection-curvature mixing, mixed-normal boundary flux, higher-gradient boundary response, and singular or topological support terms. The result is a reporting language for future experiments: instead of asking whether "electrogravity" or "inertial modification" was seen, an experiment can report upper bounds on a well-defined operator class.

Working-paper status. This manuscript is speculative and methodological. It makes no claim of experimentally demonstrated exotic propulsion, room-temperature superconductivity, inertial-mass reduction, or gravitational-wave generation. Its purpose is to state assumptions, formalize hypotheses, and define tests whose null outcomes are scientifically useful.

Contents

1 Problem

The existing JMP0X1B corpus begins with a deliberately narrow requirement: ordinary Maxwell electrodynamics must appear as a clean four-dimensional limit of any five-dimensional projection model. Paper 001 presents twelve mathematical branches for the meaning of a fifth coordinate χ, and Papers 002–005 narrow the discussion toward electrostatic, boundary-flux, gauge-current, and weak-field scalar residuals [2, 3, 4, 5, 6]. The research site also states a manuscript discipline: assumptions, claims, evidence, and release artifacts must be inspectable [1].

The Salvatore Pais patent family works in the opposite direction. It proposes device architectures - resonant microwave cavities, charged vibrating shells, high-frequency gravitational-wave generators, and vibrated composite superconducting wires - whose claimed effects are much more dramatic than their public evidential basis [7, 8, 9, 10]. Such claims become scientifically useful only after they are translated into conserved currents, stress-energy terms, boundary conditions, or measurable null observables.

This paper therefore asks a structural question:

> What local four-dimensional correction terms can be admitted by a projected electromagnetism without breaking gauge invariance, charge conservation, or exact Maxwell recovery?

2 Model

Let M^4 denote the observed four-dimensional spacetime and let $\mathcal{M}^5$ denote a speculative parent space with coordinates

$$X^A = (x^\mu, \chi), \qquad A = 0,1,2,3,4, \qquad \mu = 0,1,2,3. \tag{1}$$

A five-dimensional potential $\mathcal{A}_A$ has field strength

$$\mathcal{F}_{AB} = \partial_A \mathcal{A}_B - \partial_B \mathcal{A}_A. \tag{2}$$

The observed electromagnetic field is a projection of $\mathcal{F}_{AB}$, usually with

$$F_{\mu\nu} = \mathcal{F}_{\mu\nu}\big|_{\chi=\chi_0} \tag{3}$$

or with a compact-mode average over χ. The projected source equation is written as

$$\nabla_\mu F^{\mu\nu} = \mu_0 \left(J^\nu + J^\nu_{\mathrm{new}}\right). \tag{4}$$

Here J^ν is ordinary charge-current and J^ν_{new} is the residual induced by projection, boundary structure, scalar coupling, material response, or failure of the fifth-sector variables to decouple.

Definition 1 (Admissible projected current)**.** *A projected current J^ν_{new} is admissible if it satisfies all of the following:*

1. ***Gauge compatibility:*** *it is built from $F_{\mu\nu}$, covariant derivatives, boundary data, scalar fields, or gauge-invariant combinations of the parent variables.*
2. ***Local conservation:*** *in any closed test volume with no hidden reservoir crossing the boundary, $\nabla_\nu J^\nu_{\mathrm{new}} = 0$.*

3. ***Maxwell recovery:*** *there exists a declared limit $\mathcal{L}_0$ such that $J^\nu_{\text{new}} \to 0$ and Eq. (4) reduces exactly to Maxwell theory.*
4. ***Dimensional auditability:*** *every coupling has stated units and a stated experimental observable.*

Proposition 1 (Local polarization representation)**.** *On a contractible four-dimensional patch, any smooth identically conserved correction current can be represented locally as*

$$J^\nu_{\text{new}} = \nabla_\mu P^{\mu\nu}, \qquad P^{\mu\nu} = -P^{\nu\mu}, \tag{5}$$

up to singular, topological, or boundary-supported terms.

The proposition is a practical version of the differential-form statement that closed local currents are locally exact. It is not an ontological claim about extra dimensions. It is a constraint on what an admissible residual may look like in a laboratory report.

3 Operator families

A useful basis is not the basis with the most imaginative mechanisms. It is the basis whose experimental signatures are least degenerate. We therefore organize projected corrections into the families below.

Family	Representative form	Primary discriminants
Scalar-energy weighting	$J^\nu_s = \nabla_\mu [\alpha_s \phi F^{\mu\nu}]$	voltage-even response, range suppression, shielding dependence
Fifth-gradient flow	$J^\nu_\chi = \beta\, \partial_\chi \mathcal{F}^{4\nu}$	compact-mode dependence, modulation in hidden coordinate parameter
Projection-curvature mixing	$J^\nu_K = \nabla_\mu (K^\mu{}_\lambda F^{\lambda\nu} - K^\nu{}_\lambda F^{\lambda\mu})$	geometry and support sensitivity
Mixed-normal boundary flux	$J^\nu_n \sim n_A \mathcal{F}^{A\nu} \delta(\partial\Omega)$	edge localization and inversion tests
Higher-gradient response	$J^\nu_\nabla = \ell^2 \nabla_\mu \Box F^{\mu\nu}$	length-scale dependence, high-gradient electrode geometries
Singular or topological support	distributional currents	hysteresis, discontinuity, nonlocal boundary audit

The table does not prove that any family is realized physically. It states how a claim must present itself to be testable.

4 Claims

Claim 1 (Narrative collapse)**.** *Many fifth-dimensional stories that appear different at the level of interpretation collapse to the same four-dimensional constitutive form after gauge consistency and conservation are enforced.*

Claim 2 (No propulsion inference without stress-energy closure)**.** *A nonzero J^ν_{new} does not by itself imply thrust, inertia modification, or useful spacecraft acceleration. A propulsion claim additionally requires total stress-energy closure for the device, fields, supports, power leads, radiation, thermal gradients, and environment.*

Claim 3 (Null results are publishable)**.** *If an experiment bounds all coefficients in a declared operator family below a stated scale, the null result is a positive contribution to the research program.*

5 Evidence path

The immediate evidence path is theoretical and metrological:

1. derive the allowed operator basis for a fixed symmetry class;
2. compute conventional electromagnetic, thermal, leakage, and vibration impostors;
3. design null observables that distinguish parity, pressure, geometry, and shielding dependence;
4. report positive or negative results as bounds on operator coefficients.

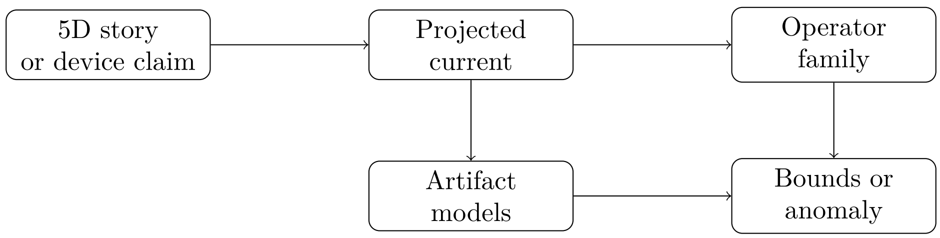

Figure 1: Translation chain from speculative source language to auditable experimental reporting.

6 Application to spacefaring research

The spacefaring value of this operator basis is indirect but important. It gives a disciplined way to evaluate field-propulsion claims, electrostatic residual claims, cavity-inertia claims, and exotic communication claims without accepting their native vocabulary. A future spacecraft-relevant experiment can declare, for example, that it tested scalar-energy weighting down to $\alpha_s < \alpha_0$, boundary-flux response below $\beta_b < \beta_0$, or higher-gradient response below a length scale $\ell < \ell_0$. That is far more useful than saying that "no force was observed."

7 Release notes

This paper should be released with:

- a symbolic derivation notebook for Eq. (5);
- a machine-readable operator table;
- a benchmark set of experimental observables and units;
- a revision log for removed, merged, or rejected operator families.

References

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