A Note for Mathematicians Engaging with VMS

This note is not a warning. It is practical guidance for mathematicians who wish to evaluate VMS as a scientific theory and who may find themselves working alongside physicists during that process.

The mathematical tools

VMS provides a public mathematical audit infrastructure built around SymPy, Z3 formal verification, and computer algebra system (CAS) auditing. These are mathematical verification tools, not conventions unique to physics. The audit suite is publicly downloadable, executable, and intended to be independently reproduced.

The mathematical object under review is therefore not simply a collection of published equations. It is an audited derivation chain.

The mathematical framework

VMS employs exterior calculus, variational methods, caustic geometry, critical point methods including the mountain-pass framework, and formal dependency tracing from explicitly stated assumptions. The Bisgard treatment appears explicitly within the closure material.

These mathematical tools are likely to be familiar to many mathematicians, and the verification methods themselves are standard mathematical techniques even if their combined use within a physical framework is unusual.

Mathematicians may also notice that many VMS derivations appear substantially simpler than the corresponding derivations presented in conventional physics texts. This apparent simplicity should not itself be taken as evidence either for or against the framework. Simplicity is not a mathematical defect. The proper question is whether each derivation is complete, logically valid, and reproduces the accepted results within its stated domain of validity.

Many of the mathematical objects used throughout VMS are individually familiar. What is unfamiliar is the dependency structure that connects them. The review should therefore focus on the dependency chain rather than the apparent simplicity or unfamiliar organization of the derivations.

The review begins before the familiar physics

One difficulty mathematicians may encounter is that the foundational assumptions of established physical theories are often treated by physicists as accepted background rather than as the primary object of review.

A physicist may immediately recognize Maxwell’s equations, the Schrödinger equation, Einstein’s field equations, or Newtonian mechanics.

Recognition is not the review.

The mathematical question is whether those results have been legitimately derived from earlier assumptions without importing downstream concepts, equations, or hidden assumptions.

VMS requires the reviewer to begin with the assumptions and follow every dependency forward.

“The math is right but the physics is wrong”

A mathematician evaluating VMS will likely hear this statement.

Before it can be evaluated, it must first be made precise.

It can mean that the mathematical derivation is valid but the physical interpretation assigned to one or more mathematical objects is incorrect.

Or it can mean that the mathematical framework does not correctly describe physical reality.

These are entirely different scientific claims.

The first requires identifying the specific mathematical object whose physical interpretation is claimed to be incorrect and demonstrating why.

The second requires identifying a prediction that fails experimental observation within its stated domain of validity.

Neither claim is established simply because VMS begins from different assumptions than conventional physics.

Different assumptions are the very point of the framework.

On inherited experimental support

When VMS legitimately derives an established physical equation within its accepted domain of validity, it inherits the experimental support for that equation within that domain.

The experimental evidence belongs to nature, not to the historical framework that first derived the equation.

If VMS correctly derives $F = ma$, Maxwell's equations, or another accepted relation over the same validity domain, then every experiment confirming those relations also confirms that portion of the VMS derivation.

Disagreeing with the starting assumptions is not, by itself, evidence that the resulting derivation is physically incorrect.

To reject that portion of VMS requires demonstrating either:

- a mathematical error in the derivation, or
- a prediction that disagrees with experimental observation.

Simply observing that VMS begins from different assumptions than conventional physics does not establish either conclusion.

What a mathematician can contribute

The dependency chain from the VMS primitives through to the recovered classical results is the proper mathematical object under review.

A mathematician is particularly well positioned to ask:

- Does each conclusion follow from its stated premises?
- Has any mathematical structure been imported without declaration?
- Are hidden assumptions entering the derivation?
- Are the closure conditions sufficient?
- Are generators introduced or genuinely derived?
- Does each dependency follow rigorously from the previous one?
- Does the framework recover the published physical results without importing them?

These are mathematical questions with mathematical answers.

They are also the central questions that determine whether VMS succeeds or fails as a scientific framework.