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Next-Generation Proprietary Pathway Intelligence System
Confidence Gate Between Analysis and Action

WHITE PAPER

THREE-BODY PROBLEM: QUINCY COMPARATIVE RESOLUTION TO NEWTONIAN MECHANICS

QSFrameworks LLC
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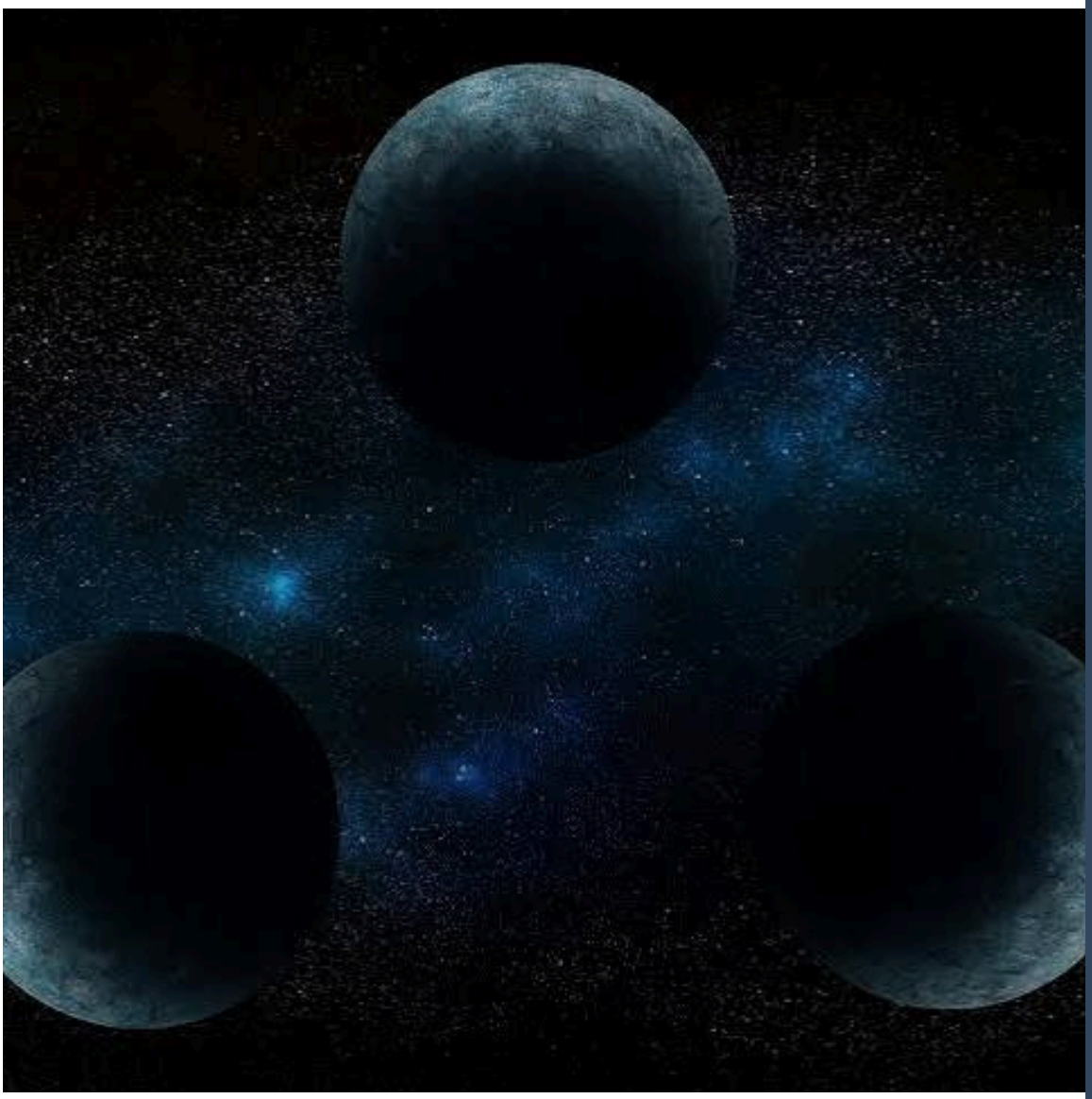


Abstract

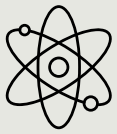
The classical three-body problem is ordinarily treated as a trajectory problem. When the system is specified sufficiently, the equations of motion determine an evolution for three mutually interacting bodies. When the specification is incomplete, however, a unique trajectory is not warranted by the information supplied. This paper examines what kind of result remains valid in such cases.

The central claim is narrow. The absence of a uniquely warranted trajectory does not by itself imply the absence of a resolved result. It implies only that the valid result may have a different form. Under incomplete specification, a system may remain resolved as a preserved interaction structure with constrained admissible developments even when it is not yet resolved as one selected path.

The classical three-body problem is used as a canonical case because it sharply separates two questions that are often conflated. One question is whether the given specification warrants a unique trajectory. A different question is whether the stated entities, relations, and constraints still warrant a valid resolve. This paper argues that these questions are not equivalent. Where specification is incomplete, the valid result may be a resolved admissible structure rather than a forced trajectory.

The argument does not reject classical mechanics, alter empirical results, or introduce a new law of motion. It concerns outcome validity only. The claim is that result type should match specification level. Complete specification may justify a selected trajectory. Incomplete specification may justify a resolved but non-selected structure.

1. Introduction



The three-body problem remains one of the clearest examples of complexity in classical mechanics. With sufficient specification of masses, positions, velocities, and governing interactions, the system evolves according to deterministic equations. Even then, the resulting motion may be highly sensitive to initial conditions and difficult to express in general closed form. None of that is in dispute.

The question examined here is narrower. It is not how to compute a better trajectory. It is what kind of result is valid when the system description is incomplete.

That question matters because two claims are often treated as though they were the same. The first is that an incompletely specified system does not warrant a unique trajectory. The second is that such a system therefore has no valid resolve. The second claim is stronger than the first and does not automatically follow from it.

A system can fail to warrant one selected path without becoming structurally void. It may still preserve entities, relations, constraints, and a bounded class of admissible developments. In that case, the valid result is not a trajectory, but neither is it an absence of result. It is a resolved structure that remains faithful to the information supplied.

The central claim is therefore simple:
A system may be unresolved as a unique trajectory while still resolved as a constrained admissible structure.

This argument is adjacent to established set-valued traditions that preserve families of admissible developments under uncertainty, including differential inclusions, reachable sets, and viability theoretic approaches. The contribution here is narrower and more specific. It is not a new solver, not a control construction, and not a new physical law. It is an outcome-validity claim framed through the canonical three-body case. The paper asks what kind of result remains warranted when the level of specification supports preserved structure but does not yet justify unique path selection.

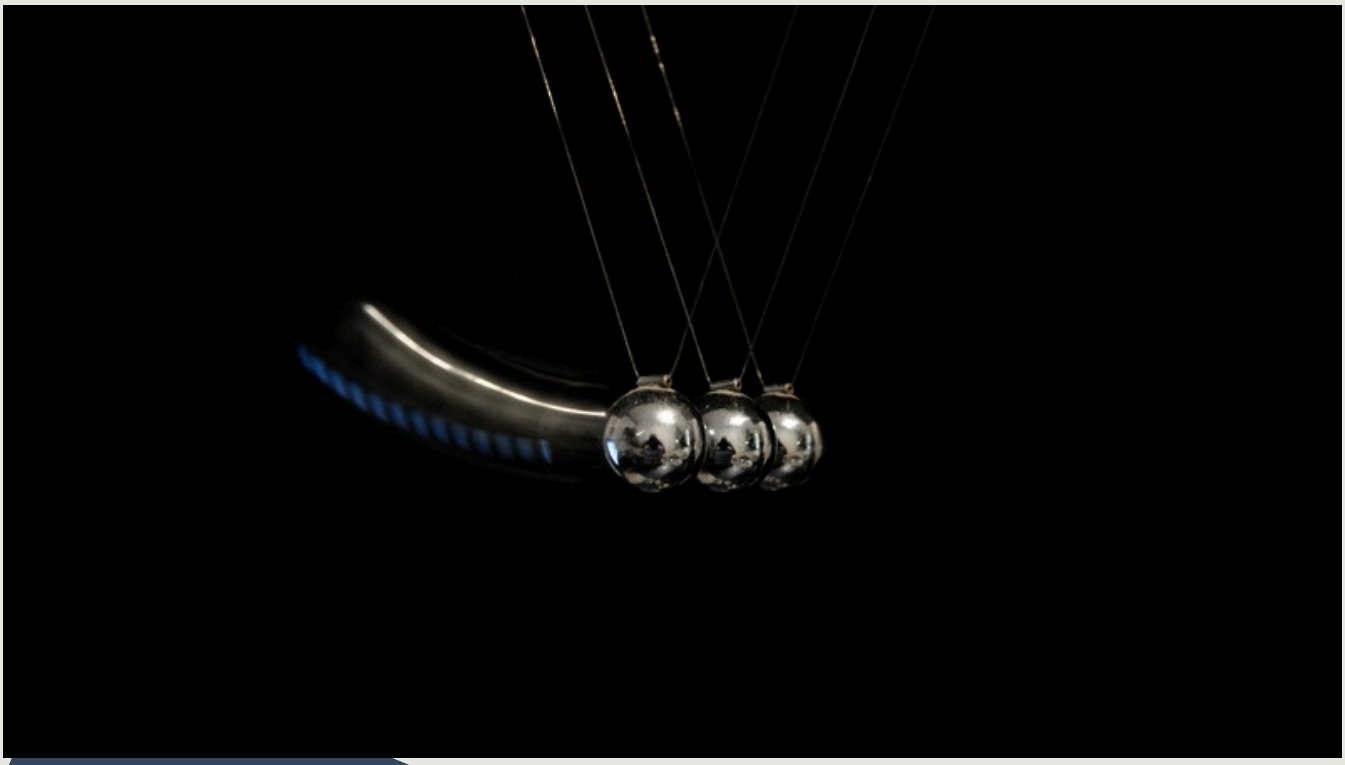
2. The Claim Being Advanced

This paper does not argue that Newtonian mechanics is false. It does not argue that deterministic dynamics should be replaced. It does not argue that every incompletely specified system is equivalent to a fully solved one.

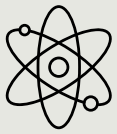
The claim is narrower and more disciplined. Classical mechanics gives a trajectory result when the information supplied is sufficient to warrant one. The present argument concerns the different case in which that level of specification has not been reached. In such a case, the absence of a selected path should not automatically be treated as the absence of a valid resolve.

The point at issue is therefore not the truth of classical mechanics. The point is the validity of the inference that no unique trajectory means no resolved result at all. That inference is too strong.

What remains warranted depends on what has actually been specified. If a system description still preserves stated entities, preserved relational capacity, active constraints, and a non-arbitrary class of admissible developments, then something real remains resolved even before one unique path can be selected.



3. Specification and Result Type



A physical system description contains more than numerical values alone. It also contains entities, relations, constraints, and rules governing admissible development. For a three-body system, the relevant descriptive content may include:

Three entities pairwise relational capacity among those entities specified and unspecified interaction components initial conditions at the level actually given constraints on what kinds of development remain admissible.

A selected trajectory answers one question:
What single path follows from a fully specified state

A resolved admissible structure answers a different question:
What result is still warranted by the state as actually specified

These are different result types. When specification is complete, they may coincide. When specification is incomplete, they separate.

That separation is the center of this paper.

4. Incomplete Specification

Incomplete specification occurs when a system contains relevant structure that has not been fully determined at the level required for unique path selection.
In the present discussion, three relational states must be kept distinct.
Undefined relation
A relation remains part of the system description but has not been numerically or operationally specified.
Zero-valued relation
A relation has no active magnitude at the evaluated state, but remains part of the system.
Absent relation
A relation is excluded from the system description.
These states are not interchangeable. An undefined relation is not the same as a zero-valued one, and a zero-valued relation is not the same as an absent one. Collapsing them together can erase meaningful structure from the system.
Under incomplete specification, a valid resolve must preserve these distinctions rather than prematurely flatten them into one category of non-result.

5. Criteria for a Valid Resolve

A valid resolve under incomplete specification must satisfy four conditions.

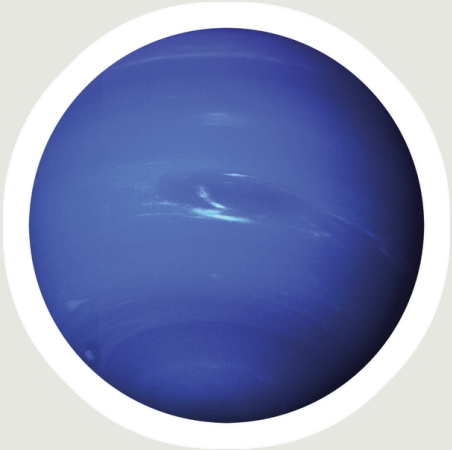
Entity preservation
The stated entities remain part of the resolved object unless removal is warranted by the specification itself.

Relational preservation
Relations are preserved according to their actual state of specification. Specified relations contribute directly. Undefined relations remain present without arbitrary completion. Zero-valued relations remain distinguishable from absent ones.

Non-arbitrary completion
The resolve must not invent missing information in order to force one selected path. A trajectory obtained only after added completion belongs to the completed case, not to the incomplete case itself.

Admissible development
The resolve must identify the class of developments still consistent with the stated conditions. This class need not be one trajectory. It may be a constrained family of admissible developments. On these criteria, an incomplete system can remain validly resolved even when it does not yet warrant one selected evolution.





6. Application to the Classical Three-Body Problem

Consider a three-body system in which all three entities are present, time progresses, and pairwise relational capacity is preserved. One relational component remains unspecified at the initial state. No additional selection rule is introduced.

The system is therefore not fully specified as a trajectory problem. A single path would require more information than has been supplied.

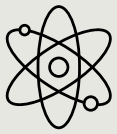
Yet the system is not structureless. It still contains three entities, a triadic interaction context, specified relational components, one unresolved relational component, and constraints on admissible development. It also preserves the distinction among undefined, zero-valued, and absent relations.

The valid result in this case is not one selected trajectory. It is the preserved three-body interaction structure together with the admissible developments still supported by the specification.

The result may therefore be stated in the following form:
The system resolves as a constrained admissible three-body structure, not as a uniquely selected trajectory.

This does not mean that multiple futures physically occur at once. It means only that multiple developments remain admissible under the information supplied.

7. Boundedness



Boundedness in this paper does not mean that every admissible numerical trajectory remains spatially bounded for all time. The term is used in a narrower sense. A resolve is bounded when its admissible developments remain constrained by the preserved entities, relations, and specification states.

In the present case, boundedness means that the result remains anchored to the three-body interaction structure. Developments that erase an entity, delete an undefined relation, or select a trajectory without additional warrant are not part of the valid resolve unless justified by further specification.

The resolve is therefore bounded by admissibility rather than by premature path selection.

8. Relation to Trajectory Solutions

A trajectory solution is not rejected by this account. It is treated as a more specific result type. When missing information is supplied, a trajectory may become warranted. That trajectory is then a valid result of the completed specification.

Before completion, however, the valid result is different. The system may warrant preserved structure without yet warranting unique selection.

This yields two legitimate result levels.

Pre-completion result
A resolved admissible structure
Post-completion result
A selected trajectory

This distinction prevents the incomplete case from being treated as though it were already complete. It also prevents a valid pre-completion result from being mistaken for no result at all.

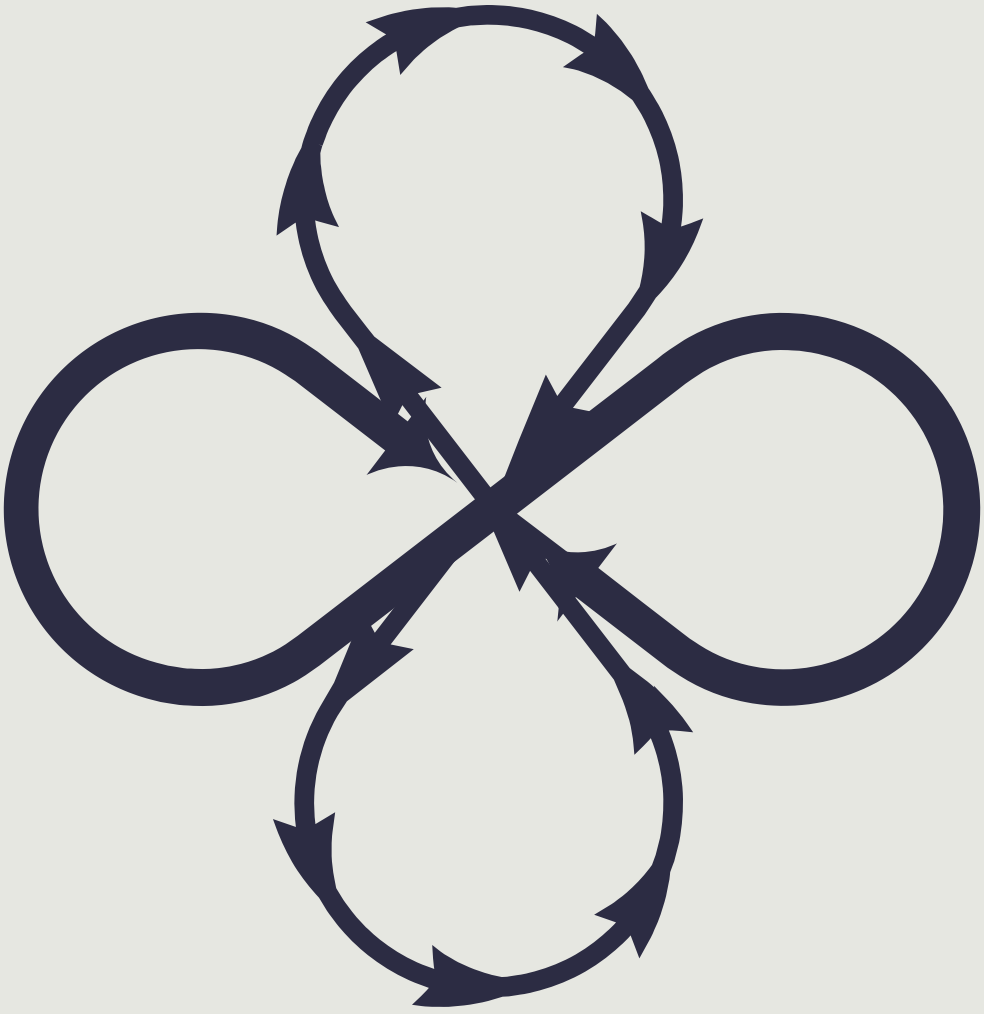
9. The Figure-Eight Orbit as a Special Post-Completion Case

The figure-eight orbit remains a useful illustration. It is an exact periodic three-body solution under highly specific conditions. Three equal masses follow one shared curve with precise phase relationships. Nothing in this paper disputes that result.

Its importance here is classificatory. The figure-eight orbit shows what becomes possible when a system is constrained enough to warrant one highly specific path. It is therefore a post-completion case.

The present argument addresses the prior question:

What remains valid before the system has been constrained enough to select one exact path Under incomplete specification, the figure-eight orbit may remain one admissible member only if its required conditions are still consistent with the unresolved structure. It cannot be selected as the result unless the necessary completion conditions are actually supplied.



10. Relation to Existing Set-Valued Approaches

This paper does not claim that families of admissible developments are a new idea. Differential inclusions, reachable-set analysis, and viability theory already preserve non-singleton evolution objects under uncertainty or constraint. Those traditions demonstrate that valid results need not always take the form of one pointwise selected path.

The narrower claim advanced here is different. It is that the three-body problem makes a useful canonical case for clarifying an outcome-validity distinction that is often left implicit. The issue is not only how to represent uncertainty mathematically. It is also how to describe the valid result object appropriate to the level of specification actually supplied.

In that sense, the contribution is interpretive and classificatory. It is an attempt to make explicit a distinction between no uniquely warranted trajectory and no valid resolve.

11. Why the Distinction Matters

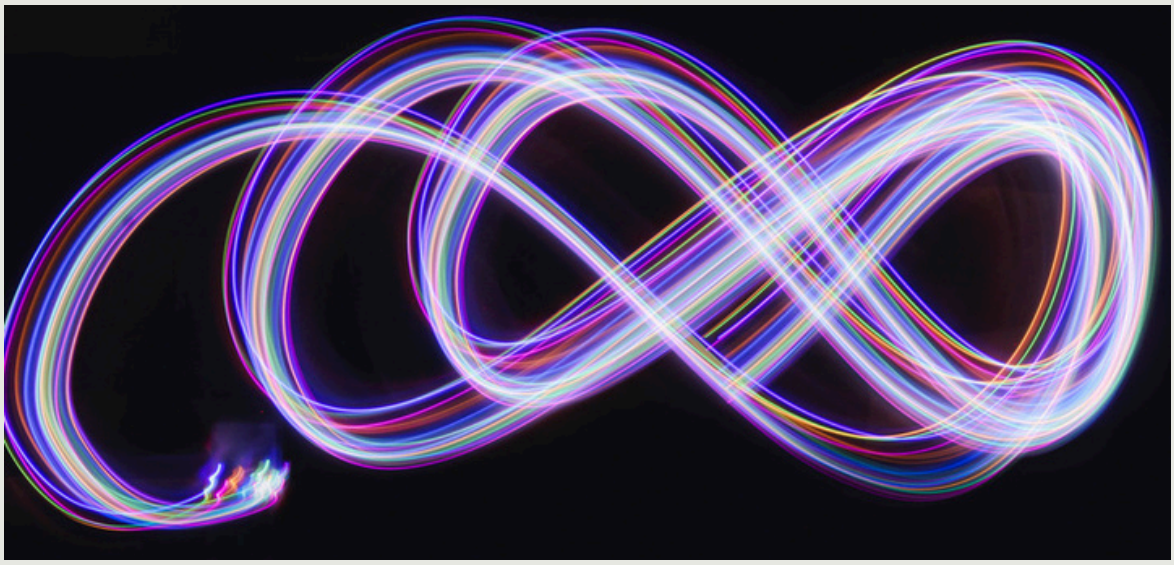
The distinction matters because many systems remain meaningful before they are fully specified. If resolution is identified only with one selected trajectory, then every incomplete system appears unresolved. That conflates two different conditions:
lack of warranted unique path lack of warranted structure

These are not the same.

A system may fail to justify one selected evolution while still preserving a valid interaction structure. The correct result should match the level of specification actually supplied. This is the paper's real contribution. It is not a challenge to the empirical success of classical mechanics. It is a challenge to the stronger assumption that a trajectory is the only form a valid result can take.

12. Limitations

This paper is not a numerical integration method. It does not replace standard trajectory computation. It does not claim to predict the exact future motion of a partially specified system. It also does not treat admissible developments as simultaneously realized physical worlds. They are admissible states of description, not multiple realized outcomes. The claim is limited to outcome validity under incomplete specification. Where the information supplied does not warrant unique selection, a preserved admissible structure may be the correct resolved object.



13. Conclusion

The classical three-body problem illustrates a general distinction between two valid kinds of result: a selected trajectory and a resolved admissible structure.

A selected trajectory is valid when the system has been specified enough to warrant one path. A resolved admissible structure is valid when the system preserves entities, relations, and constraints but does not yet warrant unique selection.

Under incomplete specification, the absence of one selected trajectory does not imply the absence of resolve. It implies only that the valid result has a different form.

The central conclusion is therefore:
A uniquely selected trajectory is not the only possible form of a valid resolved result. Under incomplete specification, the valid resolve may be the preserved admissible structure still warranted by the information supplied.

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