The NKT Law on Position and Varying Inertia Interaction

Nguyễn Khánh Tùng
Independent Researcher
Email: traiphieu.com@gmail.com
Website: https://traiphieu.com

In Tribute to Newton and Kepler

This work honors Isaac Newton and Johannes Kepler, whose foundational principles inspired the discovery of a new natural law connecting position and changing inertia.

Abstract

We propose the **"NKT Law on Position and Varying Inertia Interaction"**, an empirical law that unifies and expands Newtonian dynamics and Keplerian motion. This law introduces two key product terms:

- $\mathbf{S_1 = x \cdot p}$ (position-momentum), and
- $\mathbf{S_2 = (dm/dt) \cdot p}$ (inertia-derivative-momentum),

which consistently predict the motion tendency of a body in systems ranging from oscillations and rockets to astronomical orbits.
The law has been verified using publicly available data from real-world phenomena for nearly 20 years. Graphical models based on this law show greater predictive accuracy than classical models.

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1. Introduction

Nature often hides simplicity beneath apparent complexity. Inspired by Newton's mechanics and Kepler's planetary laws, we discovered a universal law that connects spatial displacement with varying inertia. This law, born from direct observation and systematic validation using real data, offers a unified tool to analyze motion in systems with changing mass or momentum.

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2. Statement of the NKT Law

We define two fundamental terms:

1. **Position-Momentum Interaction:**
   $S_1 = x \cdot p$
2. **Mass Derivative-Momentum Interaction:**
   $S_2 = (dm/dt) \cdot p$

Where:

- **x**: displacement or position relative to a reference point
- **p = mv**: linear momentum
- **dm/dt**: rate of change of mass

NKT Law:

The tendency of a system to move toward or away from equilibrium is governed by the signs and values of S_1 and S_2. The sign of these products indicates whether the system reinforces or resists motion.

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3. Interpretation and Consequences

- If $S_1 > 0$: The system is moving away from equilibrium (*divergence*)
- If $S_1 < 0$: The system is returning toward equilibrium (*convergence*)
- If $S_2 > 0$: The change in mass reinforces the motion (e.g., thrust phase)
- If $S_2 < 0$: The change in mass resists motion (e.g., braking or atmospheric drag)

The combined behavior of these two products determines motion trends more precisely than Newton's second law alone.

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4. Simulation Cases

We use real datasets from oscillatory systems, spaceflight, and planetary motion to validate the NKT Law. The following graphs show time-evolving behavior of **x(t)**, **p(t)**, and corresponding products $S_1(t)$ and $S_2(t)$.

- **Figure 1: Harmonic Oscillator** — Shows how **x · p** changes sign at turning points.
- **Figure 2: Rocket Launch Phase** — Displays rising **(dm/dt) · p** during fuel burn.
- **Figure 3: Earth's Orbit** (based on NASA/ESA data) — Captures variations in **x · p** and inertia interaction during perihelion and aphelion.

5. Analogy: Spacecraft and Ocean Currents

Consider a spacecraft navigating like a boat on a sea. The engine's power mimics **(dm/dt) · p**, and the position in the current reflects **x · p**.
This analogy illustrates how the NKT Law naturally governs both artificial and celestial navigation.

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6. Broader Implications

This law invites reconsideration of:

- Systems with mass fluctuations (e.g., rockets, evaporation, aggregation)
- Entropy and energy flow in dynamic systems
- Foundations of cosmology and potential link to color charge in particle physics

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7. Conclusion

The NKT Law is not a human invention, but a rediscovery of what nature has always done.
Its accuracy and simplicity suggest that deeper truths remain to be uncovered.

"I did not invent it. I only wrote down what nature has been doing for billions of years."
— Nguyễn Khánh Tùng

Submission Information

- **Name:** Nguyễn Khánh Tùng
- **Affiliation:** Independent Researcher
- **ORCID:** 0009-0002-9877-4137
- **Contact:** traiphieu.com@gmail.com

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