

A Mathematical and Physical Critique of “Newtons second law is technically disproven”

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Abstract

This paper provides a rigorous mathematical and physical critique of the manuscript titled “Newtons second law is technically disproven” [1]. The critiqued manuscript claims that Newton’s second law predicts an ever-increasing angular velocity for a mass in uniform circular motion, concluding that the law is mathematically flawed and contradicted by reality [1]. We demonstrate that this conclusion arises from a fundamental misunderstanding of infinitesimal calculus versus discrete vector addition. By applying the continuous limits inherent to Newtonian mechanics, we show that classical mechanics perfectly predicts constant speed under continuous perpendicular forces, preserving the integrity of the second law.

1 Introduction

The draft paper “Newtons second law is technically disproven” asserts that classical mechanics contains a mathematical contradiction when applied to circular motion [1]. The author argues that a perpendicular force applied to a moving mass produces a perpendicular velocity component which, when vectorially added to the initial velocity, results in a final velocity of strictly larger magnitude [1]. Consequently, the paper concludes that unpowered circular motion under Newton’s second law should result in an “ever increasing angular velocity” [1]. The author attributes the survival of the law to “sleight of hand maths” [1].

2 Mathematical and Physical Critique

The central error in the manuscript is the conflation of discrete time intervals ($\Delta t > 0$) with continuous, infinitesimal calculus ($dt \rightarrow 0$). The author envisions vector addition occurring over discrete, finite time steps [1]. If a perpendicular acceleration $\vec{a}$ acts on a velocity $\vec{v}$ over a finite time Δt , the new velocity $\vec{v}'$ according to a discrete Euler approximation is given by:

$$\vec{v}' = \vec{v} + \vec{a}\Delta t$$

Because $\vec{v}$ and $\vec{a}$ are perpendicular, they form a right triangle. By the Pythagorean theorem, the magnitude of the new velocity is indeed larger:

$$|\vec{v}'| = \sqrt{|\vec{v}|^2 + |\vec{a}\Delta t|^2} > |\vec{v}|$$

If time occurred in finite, discrete chunks, the manuscript’s assertion would be correct; speed would steadily increase. However, Newton’s second law ($\vec{F} = d\vec{p}/dt$) is a differential relationship defined precisely over the limit as $\Delta t \rightarrow 0$ [2].

To determine how the magnitude of velocity (speed v) changes over time in a continuous system, we analyze the time derivative of the square of the velocity ($v^2 = \vec{v} \cdot \vec{v}$). Using standard continuous kinematics [3], we apply the product rule for dot products:

$$\frac{d(v^2)}{dt} = \frac{d}{dt}(\vec{v} \cdot \vec{v}) = 2\vec{v} \cdot \frac{d\vec{v}}{dt} = 2\vec{v} \cdot \vec{a}$$

The manuscript explicitly stipulates a condition where the force, and therefore the acceleration $\vec{a}$, is maintained perpendicular to the momentum (and velocity $\vec{v}$) at all times [1]. The dot product of any two strictly perpendicular vectors is exactly zero ($\vec{v} \cdot \vec{a} = 0$) [3]. Substituting this into the derivative yields:

$$\frac{d(v^2)}{dt} = 0$$

This mathematically proves that the square of the speed—and therefore the speed itself and the kinetic energy—remains perfectly constant over time. The direction of the velocity vector changes continuously, but its magnitude does not.

Therefore, the prediction that circular motion will result in ever-increasing angular velocity is an artifact of discrete vector addition, not a prediction of Newton’s second law [1]. Standard continuous kinematics comprehensively resolve the alleged paradox presented in the critiqued text.

3 Conclusion

The claim that “Newton’s second law is technically disproven” [1] rests on a well-known discretization fallacy. When strictly and correctly applied using calculus—the mathematical framework explicitly developed by Newton and Leibniz for this exact purpose [2]—Newton’s second law flawlessly models reality. It confirms that spinning objects maintain a constant speed when subjected purely to continuous perpendicular centripetal forces [3]. The foundational mechanics of the *Principia* remain mathematically sound [2].

References

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