

Rhetorical Insulation and Methodological Fallacies: A Formal Critique of the Discussion Section in J.H. Mandlbaur’s “*Angular Energy*”

Dave Voorhis

Independent Researcher, United Kingdom

Gemini

AI Research Collaborator, Google

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Abstract

In the self-published manuscript “*Angular Energy*” [1], J. H. Mandlbaur claims to falsify the law of conservation of angular momentum via a purported *reductio ad absurdum* based on an idealized textbook exercise of a hand-held ball-on-a-string demonstration. While the underlying physical error of the paper—modeling an open, heavily damped, non-inertial system using an equation restricted to closed, zero-torque systems—is elementary, the manuscript’s ten-point *Discussion* section warrants dedicated formal analysis [1, p. 4]. Rather than engaging in standard scientific evaluation of boundary conditions and experimental error, the *Discussion* section constructs a closed rhetorical system designed to shift the burden of proof, outlaw the inclusion of external torques by fiat, and immunize the author’s flawed premises against rational scrutiny. In this paper, we present a rigorous, point-by-point critique of all ten arguments in the *Discussion* section, demonstrating how each collapses under formal logic, classical mechanics, and scientific methodology.

1 Introduction

In classical mechanics, the angular momentum $\mathbf{L}$ of a point mass with linear momentum $\mathbf{p} = m\mathbf{v}$ at position $\mathbf{r}$ relative to a chosen origin is defined as $\mathbf{L} = \mathbf{r} \times \mathbf{p}$ [2, 3, 4]. Taking the time derivative yields Euler’s second law (the rotational analogue of Newton’s second law), which serves as the fundamental governing equation of rotational dynamics:

$$\frac{d\mathbf{L}}{dt} = \sum \boldsymbol{\tau}_{\text{ext}} \quad (1)$$

where $\sum \boldsymbol{\tau}_{\text{ext}} = \mathbf{r} \times \mathbf{F}_{\text{ext}}$ is the net external torque acting on the system [2, 5]. Integrating Equation (1) over a finite time interval $[t_1, t_2]$ yields the general angular impulse–momentum theorem:

$$\mathbf{L}(t_2) - \mathbf{L}(t_1) = \int_{t_1}^{t_2} \sum \boldsymbol{\tau}_{\text{ext}}(t) dt \quad (2)$$

From Equation (2), the algebraic conservation relation $\mathbf{L}_2 = \mathbf{L}_1$ arises strictly as a conditional corollary that holds *if and only if* the angular impulse of the net external torque vanishes over $[t_1, t_2]$:

$$\int_{t_1}^{t_2} \sum \boldsymbol{\tau}_{\text{ext}}(t) dt = \mathbf{0} \iff \mathbf{L}_2 = \mathbf{L}_1 \quad (3)$$

In “*Angular Energy*” [1, p. 2], the author extracts the scalar zero-torque special case $L_2 = L_1$ (Equation 1 of the manuscript) from an introductory physics textbook [6] and applies it unconditionally to a hand-held ball-on-a-string apparatus whose radius is manually reduced

from $r_1 \approx 0.5$ m to $r_2 \approx 0.05$ m ($r_2 = 0.1r_1$) over a duration of $\Delta t \approx 1$ s. Substituting $L = I\omega$ and $I = mr^2$ into $L_2 = L_1$, the author computes $\omega_2 = (r_1/r_2)^2\omega_1 = 100\omega_1$, converting an initial angular frequency of 2 rps (120 rpm) into a final frequency of 200 rps (12,000 rpm) [1, p. 2]. Observing that a real hand-held ball on a string does not accelerate to Formula One engine speeds or blind students, the author invokes Richard Feynman’s famous dictum on experimental falsification and concludes that the law of conservation of angular momentum is false [1, pp. 2–3].

To insulate this conclusion from the obvious physical correction—that a hand-held ball-on-a-string revolving in air is an open system subject to large negative external torques ($\int \tau_{\text{ext}} dt \ll 0$)—the author provides a ten-point *Discussion* section [1, p. 4]. Below, we examine each of the ten points sequentially, exposing the formal logical fallacies and physical errors embedded within them.

2 Critique of the Discussion Section

2.1 Discussion Point 1: Deductive Validity vs. Soundness and the Burden of Proof

“1) This paper is a properly formatted, well written, rigorous, theoretical physics paper. A theoretical physics paper is a logical argument. A logical argument is a proof. It presents a burden of disproof. You must show false premiss or illogic, or you must accept that the conclusion is proven. Any other behaviour is, by definition, the abandonment of rationality.” [1, p. 4]

Point 1 begins with an unsubstantiated self-assessment and proceeds to conflate deductive *validity* with deductive *soundness* [9]. First, by standard scholarly criteria, the manuscript is neither rigorous nor properly formatted: it lacks vector notation, a free-body or torque diagram, an analysis of boundary conditions, an estimate of dissipative forces, and engagement with peer-reviewed literature.

Second, in formal logic, a deductive argument is *valid* if its conclusion follows necessarily from its premises, whereas it is *sound* if and only if it is valid *and* every premise is true in the domain of application [9]. Expressed formally, the author’s syllogism is:

- P1:** Classical physics predicts that a real, hand-held ball-on-a-string pulled inward over 1 s experiences zero net external torque ($\tau_{\text{ext}} = 0$) and therefore obeys $L_2 = L_1$ [1, pp. 2–4].
- P2:** Under $L_2 = L_1$, reducing r by a factor of 10 from 2 rps yields $\omega_2 = 12,000$ rpm [1, p. 2].
- P3:** Empirically, a hand-held ball-on-a-string does not reach 12,000 rpm [1, pp. 2, 4].
- C:** Therefore, the law of conservation of angular momentum is false [1, p. 3].

The author challenges critics to “show false premiss or illogic” [1, p. 4]. That criterion is immediately met: **Premise P1 is demonstrably false.** Classical mechanics does not assert that a macroscopic mass swung by hand on a flexible cord through atmospheric air experiences zero external torque. Because Premise P1 is false, the deductive argument is *unsound*, and its conclusion does not follow. Furthermore, attempting to transfer the “burden of disproof” onto the scientific community to refute an elementary modeling error commits the fallacy of *shifting the burden of proof* (*onus probandi*) [9].

2.2 Discussion Point 2: Misapplication of *Reductio ad Absurdum* Under Conjunction

“2) *Reductio ad absurdum* is considered a valid theoretical, logical argument and has been for thousands of years, since before the Romans ruled.” [1, p. 4]

While *reductio ad absurdum* is an established rule of inference in classical logic [10], citing its antiquity does not rescue a defective application of the rule. When a theoretical prediction is derived from a fundamental physical law H (here, $\frac{d\mathbf{L}}{dt} = \boldsymbol{\tau}_{\text{ext}}$) combined with a set of idealized auxiliary boundary assumptions A (here, $\boldsymbol{\tau}_{\text{ext}} = \mathbf{0}$, zero aerodynamic drag, frictionless point-like pivot, perfectly rigid fixed axis), the prediction O follows from the logical conjunction ($H \wedge A$):

$$(H \wedge A) \implies O \quad (4)$$

When empirical observation shows $\neg O$ (the ball does not reach 12,000 rpm) [1, pp. 2, 4], *modus tollens* and De Morgan’s law yield:

$$\neg O \implies \neg(H \wedge A) \equiv (\neg H \vee \neg A) \quad (5)$$

As formalized by the Duhem–Quine thesis in the philosophy of science [11], an empirical discrepancy falsifies the conjunction ($H \wedge A$), meaning *either* the fundamental law H is false *or* the auxiliary boundary assumption A is false. Because A ($\boldsymbol{\tau}_{\text{ext}} = \mathbf{0}$) is patently violated by a hand-held ball on a string in air, $\neg A$ is trivially true. Treating the false auxiliary assumption A as infallible in order to declare $\neg H$ is a textbook logical fallacy in the execution of *reductio ad absurdum*.

2.3 Discussion Point 3: Algebraic Triviality vs. Mathematical Physics Modeling

“3) *There is no mistake in the maths until you have pointed out an equation number and explained the error within it which stands up to rebuttal.*” [1, p. 4]

Point 3 equivocates between elementary algebraic manipulation and mathematical modeling of a physical system. Performing valid arithmetic substitutions from an invalid starting equation does not make the mathematics of a physics paper correct.

To satisfy the author’s demand explicitly: **the mathematical error resides in Equation 1 ($L_2 = L_1$) on page 2 of the manuscript** [1, p. 2]. As a mathematical representation of the physical system defined in the author’s *Thought Experiment*—a real ball on a string pulled inward over $\Delta t = 1$ s in ambient air [1, p. 2]—Equation 1 is mathematically false because it omits the non-zero definite integral of external torque from Equation (2). The correct mathematical equation governing state 1 and state 2 of the author’s apparatus is:

$$L_2 = L_1 + \int_{t_1}^{t_2} (\tau_{\text{drag}}(t) + \tau_{\text{pivot}}(t) + \tau_{\text{off-axis}}(t)) dt \quad (6)$$

Because the integral on the right-hand side of Equation (6) is strictly negative and comparable in magnitude to L_1 , setting it equal to zero in Equation 1 ($L_2 = L_1$) [1, p. 2] is a fatal mathematical error at the very first line of the derivation. Every subsequent algebraic step (Equations 4–13) [1, p. 2] merely propagates the error introduced in Equation 1.

2.4 Discussion Point 4: Conflation of Qualitative Pedagogy with Precision Metrology

“4) *The ball on a string demonstration of conservation of angular momentum is a brilliant demonstration that was most likely invented by Newton himself. It has been in consistent use in professional physics lectures for hundreds of years. It is an ad hoc mass and a random thread making an extremely rugged, reliable, consistent and repeatable demonstration. It is the best of the best of apparatuses.*” [1, p. 4]

Point 4 combines historical fabrication with an internal methodological contradiction. First, there is no textual evidence in Newton’s *Principia* [12] or historical archives that Isaac Newton invented or performed a hand-held ball-on-a-string classroom demonstration. Second, the author describes the apparatus as “*an ad hoc mass and a random thread*” yet immediately proclaims it “*the best of the best of apparatuses*” [1, p. 4].

In experimental physics, an uninstrumented, hand-operated lecture aid consisting of “*an ad hoc mass and a random thread*” [1, p. 4] has zero metrological validity for quantitative falsification. Classroom demonstrations of this type are used strictly to illustrate a *qualitative directional effect*: when the moment of inertia I is rapidly decreased, the angular velocity ω visibly increases ($\omega_2 > \omega_1$). Elevating a qualitative, open-air classroom visual aid above precision torsion balances, air-bearing gyroscopes, atomic interferometers, and planetary ephemerides betrays a fundamental misunderstanding of experimental physics.

2.5 Discussion Point 5: The 12,000 rpm Strawman and the Physics of Radial Pull

“5) Every rational person who has ever observed a typical ball on a string demonstration of conservation of angular momentum will strongly agree that it does not accelerate like a Ferrari engine. The string would break long before 12000 rpm could be achieved, so it is in any event totally unreasonable to claim that it is possible. Denial of the absurdity is illogical.” [1, p. 4]

Point 5 constructs a classic *strawman fallacy* [9]. No physicist claims that a hand-held ball on a string accelerates to 12,000 rpm; rather, physicists demonstrate that *classical mechanics itself forbids the hand-held apparatus from reaching 12,000 rpm*.

Analyzing the mechanics of a tenfold radius reduction ($r_2 = 0.1r_1$) from $\omega_1 = 2$ rps (4π rad/s) over $\Delta t = 1$ s [1, p. 2] reveals four severe physical barriers that the author completely ignores:

1. **Required Mechanical Work and Tension Scaling:** Even in an idealized frictionless system where $L_2 = L_1$, rotational kinetic energy $K = \frac{1}{2}I\omega^2 = \frac{L_1^2}{2mr^2}$ is *not* conserved—contradicting the very title of the author’s paper (“*Angular Energy*”) [1, p. 1]. Because centripetal tension scales as $T(r) = m\omega^2 r = \frac{L_1^2}{mr^3}$, a tenfold reduction in radius causes string tension to increase by a factor of $(r_1/r_2)^3 = 1,000$. The experimenter pulling the string inward must perform mechanical work:

$$W = \int_{r_1}^{r_2} (-T) dr = \int_{r_1}^{0.1r_1} -\frac{L_1^2}{mr^3} dr = 99 K_1 \quad (7)$$

Thus, to achieve $\omega_2 = 100\omega_1$, the experimenter must inject mechanical work equal to 99 times the initial kinetic energy of the ball within one second against a thousandfold surge in string tension.

2. **Cumulative Distance and Aerodynamic Drag:** If angular velocity increased from 2 rps to 200 rps over 1 s [1, p. 2], the ball would execute dozens of revolutions during the pull. Aerodynamic drag force on a sphere is $F_d = \frac{1}{2}\rho C_d A v^2 = \frac{1}{2}\rho C_d A \omega^2 r^2$, producing a retarding torque $\tau_{\text{drag}} = -rF_d \propto r^3\omega^2$ and dissipating mechanical power $P_{\text{drag}} = |\tau_{\text{drag}}\omega| \propto r^3\omega^3$. Under the idealized $\omega \propto r^{-2}$ scaling, aerodynamic power dissipation scales as $P_{\text{drag}} \propto r^{-3}$ —a 1,000-fold increase.
3. **Finite Pivot Radius and Capstan Friction:** A real string does not pass through a mathematical point of zero radius; it wraps across the finite lip of a guide tube or human fingers of radius $r_{\text{pivot}} > 0$. As the string is pulled inward under high tension T , capstan/Coulomb friction ($F_f = \mu T e^{\mu\phi}$) and off-center tension ($\mathbf{r}_{\text{pivot}} \times \mathbf{T} \neq \mathbf{0}$) exert a strong braking torque directly opposing the rotation.

4. **Conical Pendulum Geometry and Non-Inertial Wobble:** In Earth’s gravity g , the string sweeps a cone at angle θ below the horizontal ($\sin \theta = g/(\omega^2 r)$), and the finite mass of the ball induces non-inertial circular motion (“wobble”) of the hand or support, transferring angular momentum out of the ball.

When these negative external torques are integrated over the dozens of revolutions occurring during the 1 s pull, $\int_{t_1}^{t_2} \tau_{\text{ext}} dt$ removes the vast majority of the angular momentum, frequently leaving the linear speed $v_2 \approx v_1$ (which the author mistakes for a new law of “conservation of angular energy”) [1, p. 1]. The 12,000 rpm figure [1, p. 2] is not a prediction of physics; it is an artifact of the author’s failure to model the apparatus.

2.6 Discussion Point 6: Argument from Ignorance and Vacuum Fallacies

“6) If you imagine that the demonstration will behave accordingly in a vacuum, then it is your responsibility to show us an example and until you do you must accept my paper proven because wishful thinking is pseudoscience.” [1, p. 4]

Point 6 commits an *argument from ignorance* (*argumentum ad ignorantiam*) [9], asserting that a proposition must be accepted as proven unless opponents perform a specific physical stunt on demand. Furthermore, as demonstrated in Section 2.5, placing a hand-held ball-on-a-string inside a vacuum chamber eliminates only aerodynamic drag (τ_{drag}); it does not eliminate capstan friction at the pivot sleeve, finite pivot radius geometry, conical pendulum sag, or non-inertial pivot wobble.

When variable-radius rotational experiments *are* properly designed to minimize external torques—such as symmetrical masses sliding radially on a rigid, low-friction air-bearing or precision ball-bearing spindle—experimental measurements confirm $L_2 = L_1$ (within the small, quantifiable bounds of bearing friction) [5, 13]. Even more decisively, nature provides continuous variable-radius experiments in the hard vacuum of space: planetary and cometary orbits around the Sun. Because gravity is a central force ($\mathbf{r} \times \mathbf{F}_g = \mathbf{0}$), external torque vanishes, and orbiting bodies conserve angular momentum ($L = mr^2\dot{\theta} = \text{const}$, Kepler’s Second Law) across vast changes in orbital radius (e.g., Halley’s Comet, whose distance from the Sun varies by a factor of $\sim 60 : 1$ between perihelion and aphelion, with its angular velocity scaling precisely as r^{-2}) [2, 3].

2.7 Discussion Point 7: Omission of External Torque, Formal Fallacies, and Textbook Provenance

“7) A theoretical prediction for a generic demonstration does not include ‘friction’ or ‘drag’ or ‘wobble’ or any other complication you might dream up to try and excuse the objectively in-correct prediction. This paper is reductio ad absurdum so I am presenting the existing physics. All assumptions made are referenced equations and all referenced equations are given for the real life example presented. You have to accept them as they are or show that my reference work has been retracted. Accusing me of an omission is a fake accusation and a direct attempt to claim that this proof that physics is wrong, is wrong because the equations I have referenced are wrong (existing physics is wrong) which is literally insane.” [1, p. 4]

Point 7 is the linchpin of the author’s rhetorical defense, attempting to prohibit the application of Newtonian mechanics by decree [1, p. 4]. Because this passage compresses six distinct logical and physical errors into a single paragraph, we refute each sentence sequentially:

1. External Torque is Part of the Governing Law: The author asserts that a theoretical prediction for a generic demonstration “*does not include ‘friction’ or ‘drag’ or ‘wobble’ or any other complication you might dream up*” [1, p. 4]. On the contrary, external torque—whether arising from friction, aerodynamic drag, pivot wobble, or any other physical interaction—is an inseparable part of the Law of Conservation of Angular Momentum:

$$\frac{dL}{dt} = \tau \quad (8)$$

External torque τ is the right-hand side of the governing equation [2, 5]. Failing to account for τ when modeling a system where $\tau \neq 0$ is not “presenting existing physics”; it is making an elementary physics mistake.

2. Failure of *Reductio ad Absurdum* and Accumulation of Formal Fallacies: The author claims that “*This paper is reductio ad absurdum so I am presenting the existing physics*” [1, p. 4]. In reality, the manuscript is not a valid *reductio ad absurdum* [10], but a fallacious *argument from personal incredulity* [9] because it fails to derive any formal logical, mathematical, or physical impossibility—such as true = false, $0 = 1$, scalar speed $v < 0$, or $v > c$.

Instead, the presentation adopts an invalid premise of zero net external torque ($\tau = 0$) for the overall macroscopic system, whereas in reality only the idealized radial kinematics of the radius change conserve angular momentum in isolation. By simultaneously assuming Premise P (the system is a real, hand-held ball on a string in air where $\tau \neq 0$) and Premise $\neg P$ (the system obeys $L_2 = L_1$ [1, p. 2], which requires $\tau = 0$), the author introduces a formal contradiction ($P \wedge \neg P$) into his premise set, rendering the derivation a fallacious exercise in the *principle of explosion* (*ex falso quodlibet*) [9]. Furthermore, because the manuscript claims that physics predicts the behavior of systems subject to external torque using a formula restricted to systems not subject to external torque—something physics never does—it simultaneously commits a physics howler, a *strawman fallacy* [9], a *ludic fallacy* (misapplying simplified, idealized textbook game models to complex, unmodeled real-world systems) [14], and a fallacious *false equivalence*.

3. Cited Definitions vs. Uncited Open-System Assumptions: The author insists that “*All assumptions made are referenced equations and all referenced equations are given for the real life example presented*” [1, p. 4]. A direct inspection of page 2 and page 5 of the manuscript refutes this claim [1, pp. 2, 5]. The only cited equations in the entire paper are Equation 2, the formula for angular momentum ($L = I\omega$, cited as Ref. 1, p. 194), and Equation 3, the moment of inertia of a point mass ($I = mr^2$, cited as Ref. 2, p. 184) [1, pp. 2, 5]. Those two foundational definitions are entirely sound. Crucially, however, **there is no citation whatsoever for Equation 1** ($L_2 = L_1$) [1, p. 2], which is based on assuming zero net external torque, nor is there any citation showing that $L_2 = L_1$ is an appropriate formula for predicting real-life systems regardless of whether they are subject to external torque.

4. Textbook Provenance and Pedagogical “Retraction” of Example 10: The author demands that critics “*accept them as they are or show that my reference work has been retracted*” [1, p. 4]. There is no “reference work” cited for $L_2 = L_1$ [1, p. 2], though the un-cited ball-on-a-string exercise upon which the author’s thought experiment is modeled is **Example 10 on page 195** of the 1981 2nd Extended Edition of Halliday & Resnick’s *Fundamentals of Physics* [6].

Unlike peer-reviewed journal articles, undergraduate textbooks are not “retracted” via publisher retraction notices; rather, oversimplified or pedagogically misleading sample problems are caveated or excised in subsequent editions. That exact process occurred with Example 10: in the very next edition (3rd Edition, 1988) [7], Halliday and Resnick added explicit caveats regarding the idealized assumptions of the problem, and in subsequent editions of *Fundamentals*

of *Physics* [8], the hand-held ball-on-a-string sample problem was removed altogether in favor of rigid, low-friction rotating platform demonstrations. Thus, the un-cited textbook example underlying the manuscript is as “retracted” as textbook content can get, in the exact standard manner that textbook content is retracted.

5. Accuracy of the Omission Charge and Self-Refutation of the Thesis: Finally, the author asserts that “*Accusing me of an omission is a fake accusation and a direct attempt to claim that this proof that physics is wrong, is wrong because the equations I have referenced are wrong (existing physics is wrong) which is literally insane*” [1, p. 4]. Pointing out that the author omitted external torque τ is not a claim that the definitions $L = I\omega$ or $I = mr^2$ are wrong; it is an objective diagnosis of the author’s failure to recognize and apply the full Law of Conservation of Angular Momentum, $\frac{dL}{dt} = \tau$. Consequently, the author’s presentation simply demonstrates that the zero-torque special case $L_2 = L_1$ [1, p. 2] is not applicable to open systems subject to heavy external torque (like a hand-held ball-on-a-string), whereas the full law $\frac{dL}{dt} = \tau$ is applicable. Thus, the author’s attempt to prove that physics is wrong inadvertently demonstrates (albeit without the rigor of formal proof) that physics is right.

2.8 Discussion Point 8: Mischaracterizing Engineering Verification as “Appeal to Tradition”

“8) *The fact that engineers have shown some technical prowess and achieved things does not provide any scientific evidence that angular momentum is conserved and making that claim is an appeal to tradition logical fallacy.*” [1, p. 4]

Point 8 misuses the philosophical term *appeal to tradition* (*argumentum ad antiquitatem*) [9]. An appeal to tradition argues that a belief is true solely because it has been held for a long time. Citing modern aerospace, mechanical, and astrodynamical engineering is not an appeal to tradition; it is an appeal to continuous, high-precision empirical testing.

Modern engineering systems are not built via ad hoc “technical prowess” detached from mathematical theory. Satellite attitude control using reaction wheels and control moment gyroscopes, deep-space trajectory design, variable-radius spinning spacecraft (such as the *Dawn* or *Galileo* missions), and turbomachinery are governed by numerical integration of $\frac{d\mathbf{L}}{dt} = \boldsymbol{\tau}_{\text{ext}}$ [2, 15]. If rotational kinetic energy ($K = \frac{1}{2}I\omega^2$, predicting $\omega_2 = (r_1/r_2)\omega_1$) were conserved instead of angular momentum ($\omega_2 = (r_1/r_2)^2\omega_1$) in torque-free variable-radius maneuvers—such as the yo-yo de-spin mechanism deployed on sounding rockets and spacecraft to reduce spin rate by releasing weighted cables radially—every spacecraft de-spin calculation would be off by orders of magnitude [16]. The exact quantitative success of yo-yo de-spin mechanisms in the vacuum of space directly falsifies the author’s thesis.

2.9 Discussion Point 9: Equivocation on “The Angular Momentum Problem”

“9) *The discovery has value and solves problems. For example it clearly and undeniably solves ‘the angular momentum problem’ which has plagued scientists for decades.*” [1, p. 4]

Point 9 commits the informal fallacy of *equivocation* [9], relying on superficial keyword matching without understanding the astrophysical literature. In astrophysics, “the angular momentum problem” refers to why a gravitationally collapsing molecular cloud core—whose radius shrinks by a factor of $\sim 10^7$ from interstellar scales to stellar scales—does not spin up to breakup velocity, given that the Sun contains 99.86% of the Solar System’s mass but less than 1% of its total angular momentum [17].

Crucially, “the angular momentum problem” in star formation exists *precisely because angular momentum is conserved* ($\frac{dL}{dt} = \tau_{\text{ext}}$), requiring astrophysicists to identify the specific external torque mechanisms ($\tau_{\text{ext}} \neq 0$)—namely magnetic braking via Alfvén waves, turbulent viscosity, gravitational torques from spiral density waves, and bipolar protostellar jets—that transport angular momentum outward into the protoplanetary disk [17]. Claiming that angular momentum conservation is false does not “solve” the astrophysical problem; it contradicts the observed Keplerian velocity profiles ($v(r) \propto r^{-1/2}$, where $L/m = \sqrt{GM}r$) of protoplanetary disks and planetary systems.

2.10 Discussion Point 10: The False Dilemma of Unconditional Capitulation

“10) If you have difficulty accepting the conclusion but you have failed to find a mistake in the maths or loophole in the logic which can be directly pointed out, then you are simply refusing to consider the possibility that you are wrong. A scientist must be prepared to consider the possibility that they are wrong. Falsify the maths or concede that the conclusion is proven.” [1, p. 4]

Point 10 closes the section with a *false dilemma* (false dichotomy) [9] coupled with circular self-sealing logic. The author demands that critics “find a mistake in the maths or loophole in the logic” [1, p. 4], yet in Points 3 and 7 he pre-emptively declares that identifying the physical and mathematical invalidity of Equation 1 ($L_2 = L_1$) due to omitted external torques is a “fake accusation” and “literally insane” [1, pp. 2, 4].

By defining any critique of his false premise as inadmissible, the author constructs an unfalsifiable rhetorical loop—a hallmark of pseudoscience rather than scientific inquiry. As demonstrated in Sections 2.1 through 2.9, both the mathematical modeling error (omitting $\int \tau_{\text{ext}} dt$ in Equation 1) and the logical errors (unsoundness, violation of Duhem–Quine falsification, principle of explosion, strawman, and ludic fallacies) have been explicitly identified.

3 Conclusion

A rigorous examination of the ten points comprising the *Discussion* section of “*Angular Energy*” [1, p. 4] reveals that they do not engage in legitimate scientific discourse. In a standard physics paper, a discussion section evaluates experimental uncertainties, quantifies dissipative losses, examines boundary assumptions, and compares results against competing models. By contrast, the ten discussion points in “*Angular Energy*” operate strictly as a rhetorical shield designed to protect the misapplication of an idealized zero-torque formula ($L_2 = L_1$) from physical reality [1, pp. 2, 4].

As summarized in Table 1, every point in the *Discussion* section fails independently:

- **Points 1, 2, 3, and 10** collapse on formal logical grounds. They confuse valid syllogistic structure with sound premises, violate the Duhem–Quine structure of deductive falsification, mistake trivial algebraic substitution for valid boundary-condition modeling in Equation 1 [1, p. 2], and attempt to trap readers in a circular false dilemma [1, p. 4].
- **Points 4, 5, and 6** collapse on experimental and mechanical grounds. They elevate an uncalibrated lecture demonstration into a precision instrument, attack a 12,000 rpm strawman [1, pp. 2, 4] that classical mechanics itself rules out due to thousandfold tension scaling and dissipative torques, and use arguments from ignorance to dismiss vacuum dynamics [1, p. 4].
- **Point 7**—the centerpiece of the author’s defense—fails at every sentence [1, p. 4]. By denying that friction, drag, and wobble belong in a theoretical prediction, the author denies the right-hand side of the Law of Conservation of Angular Momentum ($\frac{dL}{dt} = \tau$). By pairing contradictory premises ($\tau \neq 0$ in reality vs. $\tau = 0$ in Equation 1) [1, p. 2], the

Point	Primary Logical / Rhetorical Fallacy	Physical / Methodological Failure
1	Conflating validity with soundness; shifting the burden of proof (<i>onus probandi</i>).	Treats the false premise $\tau_{\text{ext}} = 0$ for an open, hand-held apparatus as an indisputable axiom.
2	Defective <i>reductio ad absurdum</i> ; violation of Duhem–Quine conjunction falsification.	Falsifies the core law (H) instead of the violated auxiliary zero-torque assumption (A).
3	Equivocation between elementary arithmetic and mathematical physics modeling.	Fails to recognize that Equation 1 ($L_2 = L_1$) is mathematically false when $\int \tau_{\text{ext}} dt \neq 0$.
4	Internal contradiction; unsupported historical appeal to Newton.	Elevates a qualitative classroom aid (“ <i>ad hoc mass and a random thread</i> ”) to metrological status.
5	Strawman fallacy; argument from incredulity.	Ignores the 1,000-fold tension scaling ($T \propto r^{-3}$), 99 K_1 work requirement, drag, and pivot friction.
6	Argument from ignorance (<i>argumentum ad ignorantiam</i>); shifting burden of proof.	Ignores non-aerodynamic torques in a hand-held setup and ignores Keplerian orbital mechanics.
7	Principle of explosion (<i>ex falso quodlibet</i>); ludic fallacy; strawman; false equivalence.	Omits the right-hand side of $\frac{dL}{dt} = \tau$; relies on an un-cited 1981 textbook problem later removed.
8	Misapplication of <i>appeal to tradition</i> (<i>argumentum ad antiquitatem</i>).	Dismisses quantitative aerospace verification, including spacecraft reaction wheels and yo-yo de-spin.
9	Fallacy of equivocation on astrophysical terminology.	Misinterprets “the angular momentum problem” in star formation, which relies on $\frac{d\mathbf{L}}{dt} = \boldsymbol{\tau}_{\text{ext}}$.
10	False dilemma (false dichotomy); circular epistemic immunisation.	Demands critics find an error while declaring the identification of the error in Eq. 1 inadmissible.

Table 1: Summary taxonomy of the logical and physical failures across the ten Discussion points in “*Angular Energy*” [1, p. 4].

argument succumbs to the *principle of explosion* and the *ludic fallacy* [14]. Furthermore, its reliance on an un-cited 1981 textbook exercise (Example 10, p. 195 of Halliday & Resnick [6]) that was caveated in the 3rd edition [7] and removed from subsequent editions [8] proves that the author is attacking a discarded pedagogical simplification rather than contemporary physics.

- **Points 8 and 9** fail through informal fallacies, mislabeling precision astrodynamical engineering as an “appeal to tradition” and equivocating on the astrophysical “angular momentum problem” [1, p. 4].

In attempting to outlaw external torque by rhetorical fiat across ten discussion points [1, p. 4], the author inadvertently underscores why the full differential form $\frac{d\mathbf{L}}{dt} = \sum \boldsymbol{\tau}_{\text{ext}}$ is foundational to classical mechanics—and why a hand-held ball-on-a-string behaves in exact accordance with established physics.

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