Angular momentum is not conserved in variable radii systems

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Abstract:

A simple but mistaken assumption has led to a fallacy in science education. The application of the law of conservation of angular momentum, to rotational situations in which the magnitude of the radius changes, is flawed.

I. Introduction

I apologise. I do not mean to embarrass nor offend anyone. Unfortunately, many respected people have made and continue to make a very simple mistake. This has persisted for centuries.

I have discovered, through experiment, that there is a flaw in the laws of physics. By applying much thought, I have managed to pinpoint the problem.

Physics professors have long been using the classic ball-on-a-string demonstration. They believe that they have been demonstrating conservation of angular momentum. They are mistaken. What they have been demonstrating is the fact that angular velocity will increase when the radius decreases. We know this from the equation: angular velocity equals velocity divided by radius[1].

II. Quality of Evidence

A logical deduction based on valid premisses is the highest quality of evidence that one can possibly provide.

III. Interest to Science

This finding invalidates many published physics and other science papers. It creates a necessity for these errors to be rectified. I am sure it will lead to great advances being made in many fields of science because of a vastly improved understanding of the actual physics that are at play.

IV. Proof

Angular momentum is classically defined as the vector cross product of radius and momentum [2]. Prior to this definition, radius and momentum were independent, unrelated variables. The definition of angular momentum as the cross product of these variables does not change this status. Provided that momentum is not zero and we are referring to a rotational situation wherein the momentum is not parallel to the radius and there exists a centripetal force, the magnitude of angular momentum will change when the magnitude of the radius changes (by definition).

V. Conclusion

The application of conservation of angular momentum, to rotational situations in which the magnitude of the radius changes, is flawed.

References:

1) D. Halliday & R. Resnick. Fundamentals of Physics, 2nd edition, extended version (John Wiley & Sons, Inc., New York, 1981); p. 174.

2) D. Halliday & R. Resnick. Fundamentals of Physics, 2nd edition, extended version (John Wiley & Sons, Inc., New York, 1981); p. 181.