Conservation of angular momentum is not applicable to a mass orbiting on a tether with a changing radius

J.H. Mandlbaur, Baur research cc, 201 Republic rd, Randburg, South Africa

Abstract:

Current education in physics cites the apparent increase in speed of an object rotating on a tether whilst having the length of the tether reduced as evidence of the law of conservation of angular momentum. Newton's First Law proves that this theory is incorrect. Conservation of angular momentum is not applicable to a mass orbiting on a tether with a changing radius.

I. INTRODUCTION

For the past few months I have spent most of my time working on a personal project. I have designed and produced an array of prototypes all of which were mathematically worked out to produce certain results. All of them failed. I became obsessed in my attempts to understand why and spent ever increasing quantities of my time on this project until such time that I decided to actually test the law of conservation of angular momentum upon which this project relied. I designed a simple marble drop experiment which raced two marbles simultaneously, one which made a constant radius ninety degree turn and one which made a decreasing radius ninety degree turn. The results indicated that the magnitude of the linear momentum was conserved and the angular momentum was not. The following is a simple proof of this fact.

II. The current Understanding: A classic physics example taken directly from the "Fundamentals of Physics" text book

"A small object of mass m is attached to a light string which passes through a hollow tube. The Tube is held by one hand and the string by the other. The object is set into rotation in a circle of radius r1 with a speed v1. The string is then pulled down, shortening the radius of the path to r2."

The solution for the final linear speed using conservation of angular momentum is shown to be:

$$v2 = v1(r1/r2).$$

III. The Reality

If we apply classical newtonian mechanics to this scenario then we have to admit that the only relevant force we are applying to the object is through the string which is perpendicular to the object's rotational component of velocity. In order to change the magnitude of the rotational component of the velocity of the object, we have to apply a force which has a component that is in the same direction as that velocity component (Newton's First Law). As there is no component of any perpendicular force that is in the same direction as the respective velocity, we cannot possibly influence the magnitude of the rotational component of the velocity of the mass in the example. Since conservation of angular momentum in this example requires that the magnitude of the rotational component of the velocity is affected, it cannot possibly be valid. It follows logically that the reverse of this scenario, i.e. releasing the string slowly in order to increase the radius, is similar.

IV. Conclusion

Conservation of angular momentum is not applicable to a mass orbiting on a tether with a changing radius.

REFERENCES

D.Halliday & R.Resnick, Fundamentals of Physics, second edition, extended version (John Wiley & Sons, Inc , New York, 1981) p. 195, 14, 59.