

## **Gravity and Inertia are same phenomena**

**Author: Krishan Vats, California USA**

**Date: 07-Mar-2018, Email: kpvats@hotmail.com**

### ***Abstract -***

Gravitational mass and inertial mass, have been found quantitatively same in experiments, but they are still considered two different concepts/phenomena in all physics literature. This article puts forth the idea that the two are conceptually same, not different. Therefore they are also always found to be quantitatively same. Which is not a coincidence; It is proposed that gravity and inertia are indeed one and same phenomena. *This concept of identical phenomenon is presented to physicists to prove or disprove.* For clarifying purpose, same concept is stated multiple times with slightly different wordings.

### **Contents -**

1. Terms used
2. Gravity.
3. Inertia.
4. Not just Equivalent, they are one and the same.
5. Conclusion.

### **Terms used -**

1. Curved space, space curvature, rootedness, space dip etc. All such terms refer to the space time curve as postulated in general theory of relativity.
2. Mass, energy, mass/energy etc. All such terms refer to generalized notion of energy as postulated in general theory of relativity.

### **Gravity -**

We know from general relativity that gravity is curvature of space caused by mass/energy. This curvature of space manifests as gravity for bodies **other** than the one that causes the curvature. I will take this description of gravity as it is.

### **Inertia -**

Inertia of a body/mass is defined as tendency of the body/mass to resist a change in its state of rest, or uniform motion.

*What inertia actually is –* As we know, all mass/energy curves space in their vicinity. I propose that this curved space is a dip or rootedness of the mass in space with a certain state (of rest, or uniform motion). A force is required to change the state of this dip/curve/rootedness. Thus inertia of a body is a consequence of curving of space by mass of that same body. When we push on a mass, we are pushing on this dip of space.

*A mass/energy curves space, this curved space manifests as **gravity** for other masses/bodies. Same curvature, as a whole, manifests as **inertia** against change of state of that mass.*

### **Not just Equivalent, they are one and the same –**

Origin of inertia and gravity is same which is curving of space due to mass/energy. The difference lies only in what we call gravity and what we call inertia.

- We have chosen to call “the effect of a curved space on other bodies” as **gravity**.
- We have chosen to call “rootedness of a curved space resisting change of its own state” as **inertia**. There are no two masses, it is just one mass, one phenomena.

They are same phenomena because they both are caused by space curved by mass. Only that we have chosen to call the mutual effect of the curvature as gravity, and isolated effect as inertia. Inertia is a body’s own gravity that resists any change in its uniform state.

*It is important to note that in some contexts we already consider effects of a body’s gravity on itself, like a body gets round shape due to its own gravity, a nuclear reaction starts in a star due to its own gravity and so on. These examples should not refute the isolated nature of gravity that manifests as inertia.*

***Inertia is a measure of a body’s own gravity acting on itself. “Gravity” as we know, is a measure of one body’s gravity acting on another. They are two sides of the same coin.***

*Inertia and gravity being proposed as one and same phenomena, there is no need of proportionality between gravitational mass and inertial mass. They are one and same thing. There is no need of proportionality and then setting the proportionality constant = 1.*

### **Conclusion -**

This concept of gravity and inertia being same physical phenomena is presented to physicists to prove or disprove theoretically or experimentally.