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RESEARCH ARTICLE

IMPORTANCE OF FRAME OF REFERANCE IN GENRAL THEORY OF RELATIVITY

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ABSTRACT

Frame of reference, would have to be formulated like: Only the water "rotates" with a certain angular velocity, its surface is a plane. The deviation from a plane increases with the deviation from this particular state of motion. The state of rest produces also a paraboloid. Again the rotation of the Pail is immaterial. Newton's Pail experiment brings out very clearly what is meant by "suitable" Frame of reference. We can describe nature and we can formulate its law using whatever Frame of reference we choose.

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INTRODUCTION

Newton gave a comprehensive presentation of the Physics to show that some Frames of reference were more suitable for the description of nature than others by giving famous Pail experiment. Newton filled a Pail with water, by twisting the rope which supported the Pail, he made it rotate around it axis. When the water gradually begin to participate in the rotation, its surface changed from a plane to a Paraboloid. When the water had gained the some speed of rotation as the Pail, he stopped the Pail. The water slowed down and eventually come to complex rest. At the same time its surface resumed the shape of the plane. The above description is based on a Frame of reference connected with the Earth. The law governing the shape of the water's surface could be formulated thus. The surface of the water is a plane whenever the water does not rotate. It is a Paraboloid when the water rotates, the state of motion of the Pail has no influence on the surface.

The whole experiment can be described in terms of Frame of reference rotating relatively to the Earth with a constant angular velocity equal to greatest velocity of the Pail. First the rope, the Pail and the water "rotate" with a certain constant angular velocity with respect to our new Frame of reference and the surface of the water is plane. Then the rope and the Pail is "Stopped" and water is gradually "Slow down", while its surface become a paraboloid. After the water has come to a "Complete rest", its surface still a poroboloid, the rope and in turn the pail, is again made to "rotate" relatively to our Frame of reference [ie stopped with respect to Earth]; the water gradually begins to participate in the "rotation" while its surface flattens out. In the end, the whole apparatus is 'rotating' with is its former angular velocity and the surface of the water is again a plane. With respect to this Frame of reference, the law would have to be formulated like this: Only the water "rotates" with a certain angular velocity, its surface is a plane. The deviation from a plane increases with the deviation from this particular state of motion. The state of rest produces also a paraboloid.

Again the rotation of the Pail is immaterial. Newton's Pail experiment brings out very clearly what is meant by "suitable" Frame of reference. We can describe nature and we can formulate its law using whatever Frame of reference we choose. But there may exist a Frame or Frames in which the laws of nature contain fewer elements than they would otherwise. In our description of nature were based on the Frame of reference connected with the Pail, many physical laws would have to contain an additional element, the angular velocity "$\underline{\omega}$" of the Pail relative to a "more suitable" Frame of reference, let it may be Earth. The laws of motion of the Planets becomes basically simpler when they are expressed in terms of Heliocentric Frame of reference instead of the Geometric Frame. Once it was clearly recognized that the choice of a Frame of references determine the form of a law of nature, investigations were carried out which established the effect of this choice in a mathematical form.

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