

# Is the Earth an Inertial System?

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*Abstract – The earth rotates almost exactly along a circle around the sun, notwithstanding the fact that the sun lies significantly outside the centre of this circle. Assuming a perfect circle, the question is whether the earth in such a situation is an inertial system or not.*

## Introduction

The question can be found on the Internet too [1], but including into the consideration the rotation of the earth around its North-South pole axis too has generated confusion. This rotation is excluded in this paper. The so-called Foucault pendulum demonstrates this rotation.

## Definition of an inertial system

An inertial system is a system that does not de- neither accelerate in whatever direction. As a result its velocity is constant. No forces are exerted on the system.

## Properties of a circular orbiting system

The velocity of such a system is constant, notwithstanding the fact that its components in the plane of the orbit are not constant. The forces that are exerted on the system (centripetal and centrifugal force) eliminate each other perfectly. So eventually, no forces are exerted on the system.

## Answer to the question

A circular orbiting system is an inertial system, because net there is no force exerted on the system.

## Conclusion

No experiment, not making use of external references, can be carried out on earth that will measure its orbital velocity.

[1] <https://www.quora.com/Is-the-earth-as-a-whole-considered-to-be-an-inertial-or-non-inertial-frame-of-reference>