Billiard Project

Software Development

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Abstract

The goal of this project is to be able to produce videos and widgets representing a point/ball in a billiard with a simple shape and showing its trajectory.

More information can be obtained here :
`https://jakevdp.github.io/blog/2012/08/18/matplotlib-animation-tutorial/`

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Square Case

Let us start we the simplest case : The square billiard

Remark

In this example, we assume that there is no friction and the Descartes rules are satisfied

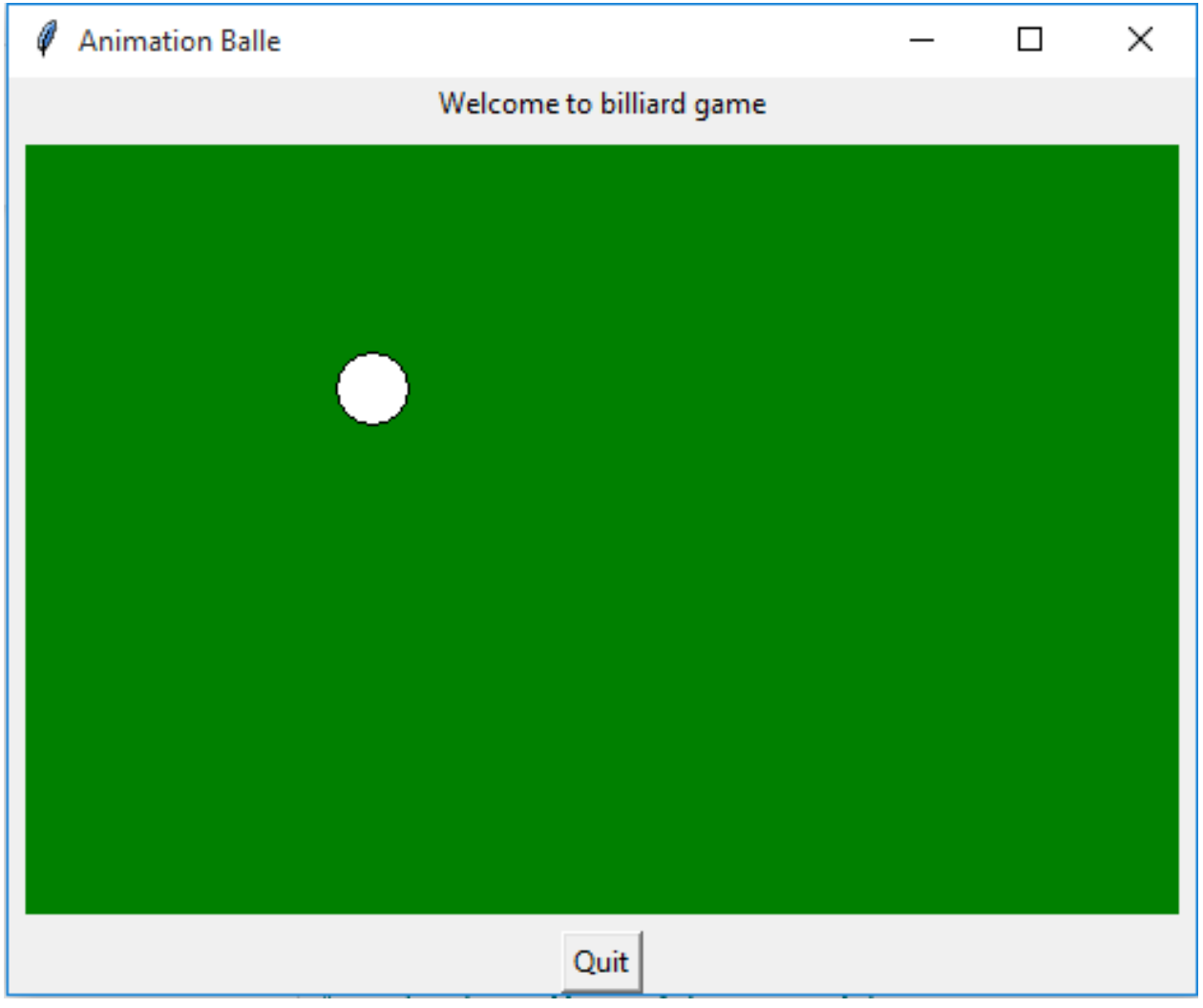
Important theorem

Sample text in red box

Square Case

We start by creating a window by using "tkinter" inside which we create a square shape which represent our billiard and a ball. We also create a button "quit" to quit the game. After running the code, we get the figure below:

Square Case



Square Case

Then, we use python to create a code that we allow us to move the ball into the square billiard. After running the code, we get the animation below:

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Flat Torus Case

Remark

A Torus T can be defined by the set :

$$T = \left\{ (x, y, z, w) \in S^3 | x^2 + y^2 = \frac{1}{2}, z^2 + w^2 = \frac{1}{2} \right\}$$

where S^3 is a 3-sphere.

Flat Torus Case

Now, we are going to create also with "tkinter" a window. Into this window we are going to create an oval shape which represent our flat torus (torus in 2D) and a ball into this torus. We also, create a button "quit" to quit the game. After, running the code we get the figure below:

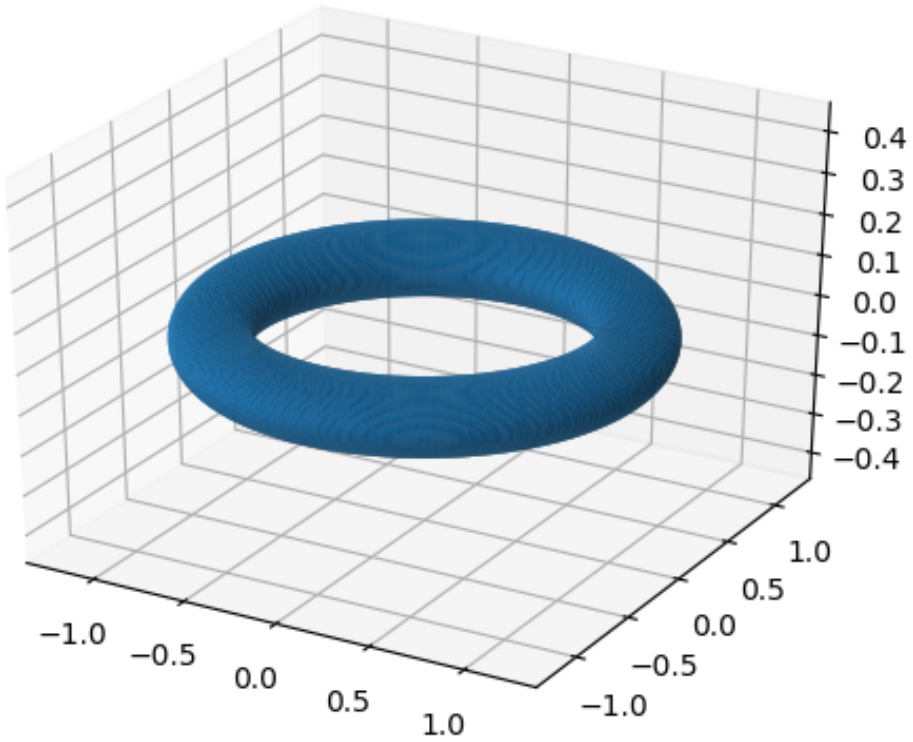
Flat Torus Case

Flat Torus Case

We create a code in python to move the ball into the flat torus billiard. After running the code we get the animation below:

3D Torus Case

Now, we create a torus in 3d and we get the figure below:



3D Torus Case

By using "mayavi" we can see displacements of a ball in a 3D torus.

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