

3D Ball Simulator User Manual

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Running the program will draw the initial surface of the function $F(x,y) = x^2 + y^2$ and it will spawn a ball that will follow some rules of physics to move on the surface.

Mouse Controls

Holding the left mouse button and moving the mouse will relatively translate the location of the perspective.

Holding the right mouse button and moving the mouse will relatively rotate the perspective around the z axis for left and right movement and around the x axis for up and down movement.

The mouse wheel can be used to zoom in and out.

Keyboard Controls

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| Spacebar | plays/pauses the animation. |
| '.' | increases the velocity of the ball |
| ',' | decreases the velocity of the ball |
| 'k' | decreases the drag of the ball |
| 'l' | increases the drag of the ball |
| 'z' | decreases the ball's radius |
| 'x' | increases the ball's radius |
| '[' | increases the ball's x position |
| ']' | decreases the ball's x position |
| '_' | increases the ball's y position |
| '=' | decreases the ball's y position |
| 'n' | resets the simulation. |
| 'r' | resets the perspective to its default. |

Using numbers 1,2,3 on the keyboard will switch between 3 available functions for the surface

1. $F(x,y) = x^2 + y^2$
2. $F(x,y) = (x^3 - 3x) + (y^3 - 3y)$
3. $F(x,y) = x + y$