**Pressure at the Center of the Earth**

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**INTRODUCTION**

To find the pressure at the center of the Earth, we need to find the density and the mass at the center of the earth. The main challenge of this project is to find the density of the earth at the different points of the earth. As we go inside the earth, the density increases.

So, we considered the small element inside the Earth at distance “r” from the center of the earth. Let the height of this object be “r”.

d

Fig 1: A small element of mass ‘m’ at the distance ‘r’ from the center of the earth of radius ‘R’

**THEORY OUTLINE**

The net force acting on this element is zero since the object does not move. The pressure at the bottom of the object (at the distance “r”) is greater than the pressure at the distance “r+ r”. So, the force due to pressure will be

FP(on r)=[P(r) – P(r+r)]\*A

This force will be equal to the Gravitational force acting on that object which is:

FG(on )=

Where M is the mass enclosed by the object and m is the mass of the object.

We divided the project into three categories. First, we put the density of the earth as constant which is roughly equal to 5.51 g/cm3. And then we found the mass enclosed by the object by integrating the constant density.

M=d3r

=42dr

=42dr

M= 4 r3

This equation is true in the case of constant density.

Second, we divided Earth into crust, upper mantle, lower mantle, outer core, and inner core and calculated mass enclosed in each of them. We wrote a small program in Python to calculate the density and mass enclosed in each of the layers of the Earth. We passed the value of density at different layers from one function and calculated Mass enclosed in another function for different densities. By doing this, we will get more realistic value of density and the pressure inside the earth than the previous step.

A close up of a map

Description generated with high confidence

Fig: Density Distribution between Different layers of Earth

Since we know the density of the earth at different layers, we can calculate the mass enclosed by using the formula:

M=d3r

M=2dr

Since we know the density of earth at different layers from the table above, we can calculate the mass enclosed by the small element using this formula.