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**Moment Of Inertia**

**Objective**- To measure the moment of inertia of a system consisting a disk and a ring. And compare it with the theoretical value of moment of inertia.

**Procedure**- A disk of mass of 1.41936 kg is placed on a rotating stand. And above the disk, a ring of mass 1.43109 kg is placed. The rotating stand is wrapped up by the string of negligible mass, which is allowed to pass through the photo gates. For the first trial the mass of 50 grams is attached to the end of the string and the mass is allowed to free fall, making the disk and the ring rotate around the stand. The photo gate records the velocity and time and gives the slope which is acceleration of the system. Simultaneous, the mass of 100 grams, 150 grams and 200 grams are attached to the string and the respective accelerations are recorded.

**Data**-

**Calculated Value of Moment of Inertia(I)**

|  |  |  |
| --- | --- | --- |
| Trial # | Mass of the hanging object (Kg) | Acceleration of the system (m/s2) |
| 1 | .050 | .0049 |
| 2 | .100 | .0103 |
| 3 | .150 | .0157 |
| 4 | .200 | .0218 |

The following formula provides the calculated Moment of Inertia of the disk and ring in (kgm2).

Where **m** is the mass of hanging object. **r** is the radius of the rotating stand (.0125m), **g** is the acceleration due to gravity (9.8m/s2) and **a** is the acceleration found.

|  |  |  |  |
| --- | --- | --- | --- |
| Trial # | Mass of the hanging object (Kg) | Acceleration of the system (m/s2) | Moment of Inertia  (Calculated in Kgm2) |
| 1 | .050 | .0049 | .0156 |
| 2 | .100 | .0103 | .0148 |
| 3 | .150 | .0157 | .0146 |
| 4 | .200 | .0218 | .0140 |

**Theoretical Value of Moment of Inertia (I)**

Mass of the Disk = 1.41936 kg Radius of the Disk= .115 m

Mass of the ring= 1.43109 kg Inner radius of the ring=.055 m

Outer radius of the ring = .065 m

Moment of Inertia (theory)

I (theory) = .0145 kgm2

Panoramic View

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Trial # | Mass of the hanging object (Kg) | Acceleration of the system (m/s2) | Moment of Inertia (calculated in Kgm2) | Moment of Inertia (theoretical in Kgm2) |
| 1 | .050 | .0049 | .0156 | .0145 |
| 2 | .100 | .0103 | .0148 | .0145 |
| 3 | .150 | .0157 | .0146 | .0145 |
| 4 | .200 | .0218 | .0140 | .0145 |