MECH 230 Dynamics Homework 8

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Due Wednesday November 20, 2024

1. Read the problem statement of MKB B/047.

B/47 Determine the products of inertia about the coordinate axes for the unit which consists of four small particles, each of mass m, connected by the light but rigid slender rods.



Label the particles 1, 2, 3, 4 going from left to right and take the $\{\mathbf{E}_x, \mathbf{E}_y, \mathbf{E}_z\}$ basis to be along the directions shown.

- 2. Write the expressions for the position vectors \mathbf{r}_i , $i = 1, \ldots, 4$ in terms of l.
- 3. Verify that the center of mass of this body is at the origin.
- 4. Recall that for a continuous body, its product of inertia about its center of mass are

$$I_{xy}^C = -\int_B xydm, \quad I_{xz}^C = -\int_B xzdm, \quad I_{yz}^C = -\int_B yzdm,$$

where for a typical material point on the body with mass dm. Its position vector from the center of mass is $\mathbf{r} - \mathbf{r}_C = x\mathbf{E}_x + y\mathbf{E}_y + z\mathbf{E}_z$.

5. Calculate the products of inertia about C for this system of particles.

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