Dynamic simulation

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Goal: Discuss one of the use cases shown below.

Brief description of the worst use case

During this assignment we have to choose one of the worst use of case options and we selected the third one in which a kid stretches the toy from the end parts with a force of 10 N.

In our simulation trying to assimilate to the case of use selected we put a pull force of 10 N in one side and we restricted the other one that generates an inverse similar force. Resulting in a pull movement as the one described in the worst case of use.

Also, in the simulation we restricted the axes connected to the center cube avoiding an extra up and movement of the stick in the moment that the pull force is applied, but there is still an oscillatory movement.

Forces Scheme

Pulling force = 10N
Elapse simulation time = 5 seconds
Steps by unit simulation = 50

Fixed points in the movement of the baby toy. First image of figure 1 shows that one stick is stiff and the other two images show that the four rotation axes do not move either.

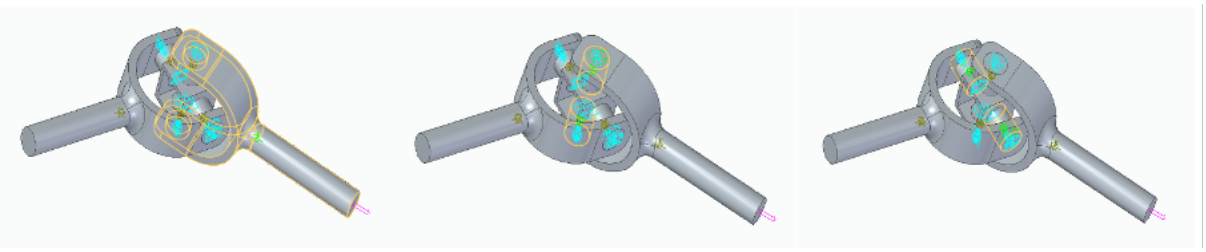

Figure 1: Simulation fixed points.

There is an oscillator movement in one stick that has a pulled force of 10 N while the other one is static, simulated the struggle movement of a kid, because the form of the object made a little up and down move in the stick where the force was applied. Figure 2 simulates these oscillator movement of one stick.

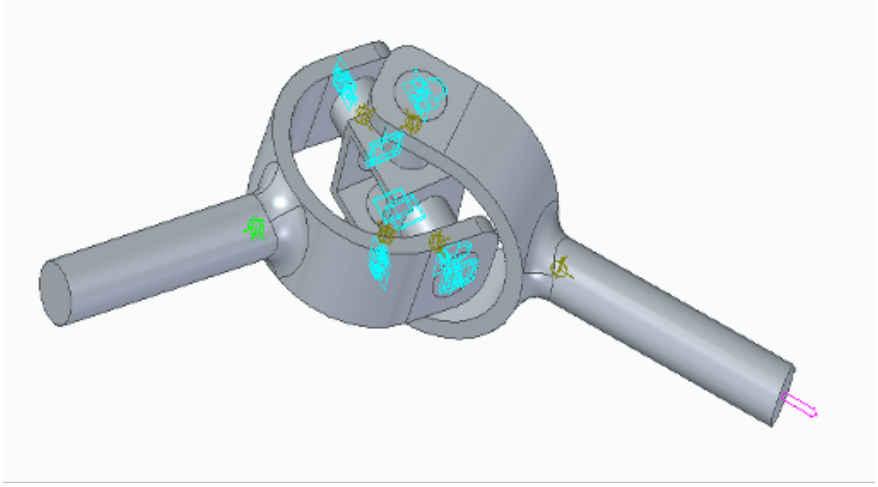

Figure 2: Simulation movement.

Interpretation of the simulations

Movement of the toy:

z = angular acceleration (degrees/sec^2)
x = time (s)

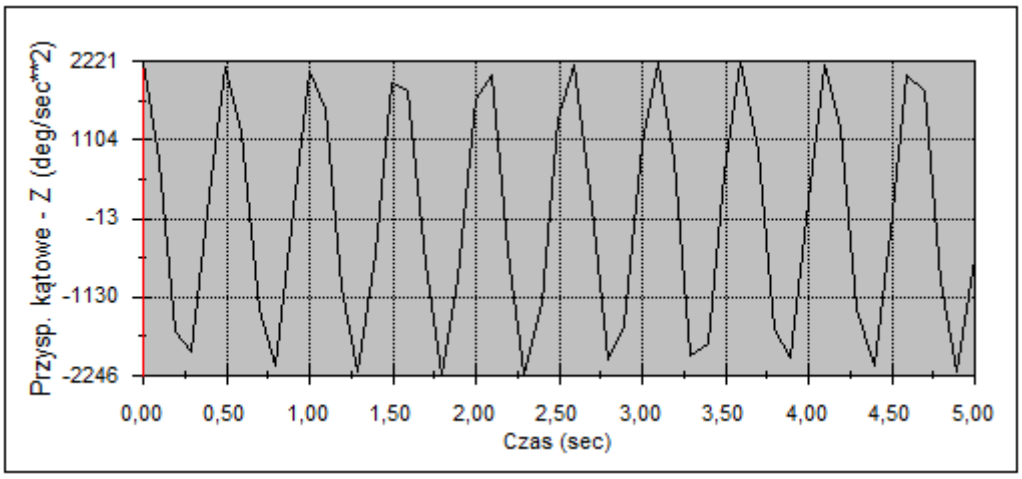

Figure 3: Simulation resulting force.

The resultant force is in the z-plane (deg/sec^2) so that we have this graph of the resultant force in time (sec) where the force oscillates between 2221 deg/seg^2 to -2246 deg/seg^2. Due to the resultant oscillator movement, we get in the simulation the resultant force has this variation between the positive and negative result.