Introduction to Mechanical Engineering, HW CAE DYN 1

Inverse Dynamics Problem

Innopolis University

Short Task Description

Description: Solve Inverse Dynamics problem for four link bar mechanism by coding and by NX Motion Analysis application.

Artifacts:

- Zip archive with NX detail files (.prt) and simulation (.sim)
- Code, which can be executed anywhere
- 1-3 pages report in (.pdf). It should contain formulas, explanation, considered assumptions and results.

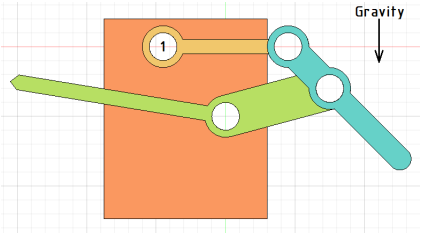
Extended Task Description

Zip archive, which contains all needed data:

HWs/HW_CAE_DYN1/task_data

1st joint is controllable, others — not.

1. **Find angle limits** (where the mechanism stuck) for controllable joint:
   - By code (solving kinematics problem for each angle)
   - Using NX (either Modeling, or Animation Designer);
2. Compare results, present them as a pie chart in report.
3. **Make the scene in Motion Analysis**. All links are made from «Bronze». You need to add joints, contacts, direct earth gravity correctly.
4. Choose the biggest angle gap between joint limits and put your link in the beginning of it.
5. Apply constant angular acceleration for 1st joint — 0.2 rad/s^2
6. **Find a torque for 1st joint** for such angle gap:
   - By code (solving Inverse dynamics problem)
   - Using NX (any solver);
7. Compare results



Deserve “A” grade!

– Oleg Bulichev

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Room 105 (Underground robotics lab)