Institute for Multiscale Simulation

MSS

Master Thesis

Dynamics of mechanical macro-polymers.

Type

Experimental.

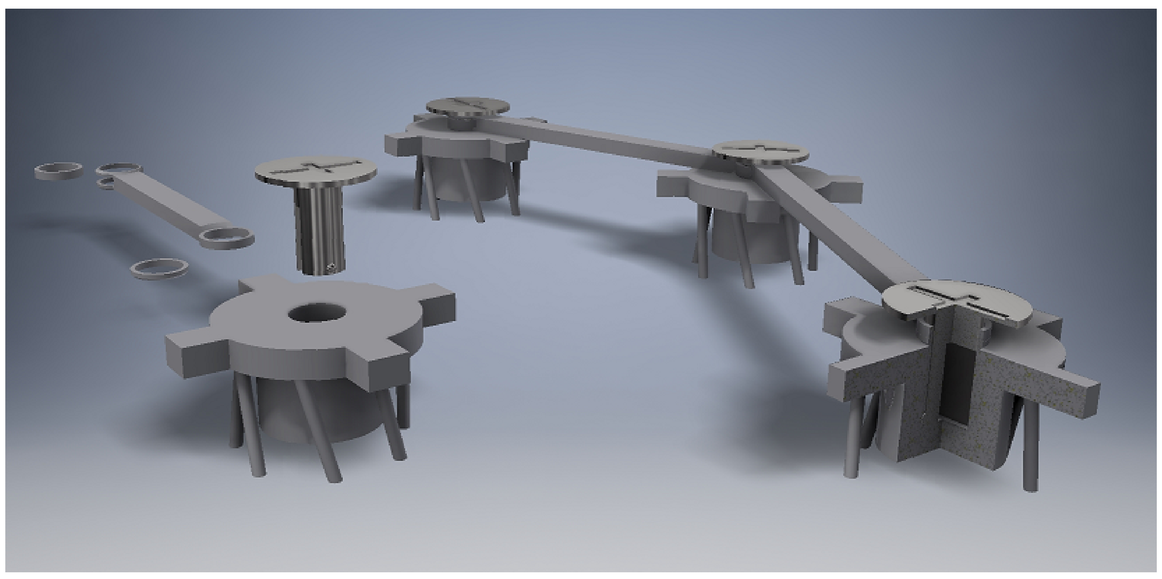
Requirements

- Basic knowledge of 3D printing techniques.
- Experimental skills
- Knowledge of digital image processing techniques.
- Knowledge of C++/Python or MatLab.

QR code
zum pdf der Ausschreibung

Background

A **VibRot**, is a device capable to convert vibrational energy into rotational energy by means of friction. Connecting many of these particles by rigid bars (macro-polymer, see figure) resembles a polymer with a characteristic constant persistence length. This project is intended to study the dynamic properties of isolated and interating macro-polymers, as well as the impact of changing properties such as the number of elements of the macro-polymer, the distance between them (persistence length) and the shape of the macro-polymer itself.



Aim

One of the most important properties of a polymer is its persistence length, which quantifies its bending stiffness, i.e., for pieces of the polymer that are shorter than the persistence length, the molecule behaves like a rigid rod, while for pieces of the polymer that are much longer than the persistence length, the properties can only be described statistically. Constructing a macroscopic-mechanical-polymer could help to understand how the dynamics of such system depends on purely geometrical properties: the persistence length, the total length of the polymer as well as its shape. Some of the goals of this projects are:

- **Manufacture macro-polymers with different properties by using VibRots (number of particles, distance between particles, shape of the polymer).**
- **Perform experiments where the macro-polymers are:**
  - **completely isolated (no interaction).**
  - **immersed in a bath of single VibRots.**
- **Implement a Matlab/C++ program for tracking the position of the particles and the shape of the chain.**

For further information please contact:

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