Project Progress - Week 1 of March 2025

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This is a file that contains the tracking of the activities related to the Hydrodynamic Interactions project during the first week of March 2025. The activities are divided into groups and a summary of the progress is provided.

1 Initial Status of the Project

The project has made significant progress up until the first week of March 2025. The key achievements include:

- Meetings with Raúl to discuss the hydrodynamic interactions.

- Documentation in Notion of the basic theory behind hydrodynamic interactions.

- Preliminary exploration of the "spreadinterp" repository.

- Creation of a general function to obtain the mobility tensor given a solver and a set of particle positions.

- Initial tests for obtaining the "Self-Mobility Tensor".

2 Potential Tasks for the Week

The following tasks have been identified as potential areas of focus for the first week of March 2025:

- Development of the Python module with the implementation functions.

- Tests for obtaining the RPY tensor. Discussion of the representation and its properties.

- Initial functions to establish specific particle arrangements and geometries.

3 Week Tracking

3.1 Monday - March 3, 2025

The repository has been reorganized, and the functionalities of `.gitignore`, `setup.py`, and `__init__.py` have been discussed to manage the import of functions and modules. The use of pytest and the inclusion of asserts in the test functions are emphasized. The correct functioning of the self-mobility tensor test is verified.

3.2 Tuesday - March 4, 2025

I have been learning how to compile LaTeX projects located inside the repository. The pdf tab viewer in VSCode has been installed and configured to facilitate the visualization of the documents. This document serves as an example of the compilation process.

3.3 Wednesday - March 5, 2025

The tasks for the week have been specified and the progress in documentation, code, and testing has been tracked. The script `test/test_RPY_distance.py` has been created to obtain the RPY mobility for two particles as a function of the distance between them. The script checks the symmetry of the tensor, the reproduction of the self-mobility elements on the diagonal, the symmetry of the elements of the off-diagonal blocks of cross mobility, the nullity of the elements corresponding to crossed coordinates (the particles are on the x-axis), and the equivalence between the two yy, zz terms (perpendicular to the axis that joins the particles) of the cross mobility diagonal. The script also generates a graph with the dependence of the non-zero elements of the cross mobility with the distance between the particles, from 0.1 to 10 times the hydrodynamic radius of the particles. The ordering and storage of this type of graphs in the repository must still be studied.

4 Current Next Steps

The next steps for the project include:

- An script that obtains the RPY mobility for two particles as a function of the distance between them.

- Development of the Python module with the implementation functions.

- Tests for obtaining the RPY tensor. Discussion of the representation and its properties.