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3D Dynamic Simulations of Sea Fan Structures[1] ARIANA VLAD, ASJA RADJA, ANNA LAPPALA, Harvard University — Sea fans are a variety of corals structured in a flat fanlike pattern of numerous cylindrical polyps. Their morphology has been previously studied through 2D images and digitized data points depicting the structures have been obtained. The project employs polymer physics and molecular simulations to study samples of tree-like and network structures and analyze differences in their dynamics. The sea fans motion was initially simulated with the Large-scale Atomic/Molecular Massively Parallel Simulator Molecular Dynamics software by connecting the data points through harmonic bonds and modulating the flexibility/bending stiffness through an angle potential between three particles. Next, hydrodynamics was integrated using Smooth Particle Hydrodynamics and the Constant Energy Dissipative Particle Dynamics. Preliminary analysis of the output through particle displacements computations suggests that tree structures tend to be more dynamic than networks and that the greatest displacements correspond to outer particles, a result consistent with experimental findings. Further analysis of all available structures is necessary to conclusively find the correlation between the morphology of sea fans and their environment.

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