Universität Duisburg-Essen

Master Thesis

Topic **Investigation of Plankton Escape Mechanisms: Flow Sensing, Strategy Optimization, and Predator-Induced Flow Fields**

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Plankton rely on highly sensitive flow detection mechanisms to evade predators in aquatic environments. The aim of the master thesis it to investigate the escape strategies of plankton in response to predator-induced flow fields and vortices. The effectiveness of different escape mechanisms across varied flow conditions are to be explored based on advanced fluid dynamics simulations and modified Maxey–Riley equations. Further on, Machine learning models shall be used for data analysis and pattern recognition to identify behavioral trends in escape responses, while reinforcement learning optimizes escape strategies based on simulated flow fields. The findings shall provide deeper insights into predator-prey interactions, offering implications for ecological modeling and the adaptive evolution of planktonic behavior.

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