TUAT Fluid Dynamics Seminar

Running on top of a liquid: The impact-induced hardening and the viscoelastic response of the impact process on dense suspensions

Speaker: Pradipto (PhD Candidate)

Yukawa Institute for Theoretical Physics, Kyoto University

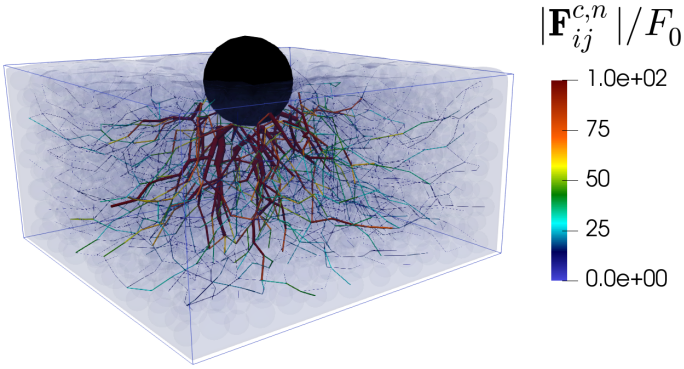
Date: Friday, November 5th, 2021

Time: 11:15 am - 12:15 pm

Venue: Online *Your presence and punctuality will be highly appreciated

https://meet.google.com/cut-tcuz-ymv

Abstract



A suspension is a mixture of macroscopic and undissolved particles in a liquid. Such suspensions surround our daily life. One can observe the impact-induced hardening in dense suspensions, where the suspensions behave liquid-like at rest and abruptly turn solid-like under impact. This phenomenon enables people to run on top of the suspensions. In this talk, we will discuss the numerical approach to study the impact-induced hardening in dense suspensions with the lattice Boltzmann method that incorporates the contact between suspended particles and the free surface of the suspension. Then, we will discuss the rebound motion of a free-falling spherical impactor on top of the suspensions, how the frictional interactions between suspended particles affect the rebound, and how the impact induced the emergence of a dynamically jammed region beneath the impactor [1]. We will also discuss the connection between the rebound motion, the impact speed, and the maximum force acting on the impactor. Finally, we will discuss our proposed phenomenology that can recover the viscoelastic response of the impactor during the impact [2].

[1] Pradipto and Hayakawa, H., *Phys. Rev. Fluids*, 6, 033301 (2021).

[2] Pradipto and Hayakawa, H, *Phys. Fluids*, 33, 093110 (2021).

Biographical Sketch

Born on July 11th, 1993 in Indonesia, Pradipto obtained a B.Sc in Physics from Bandung Institute of Technology, Indonesia in 2016. In 2019, he received a M.Sc in Physics at Kyoto University while working under Prof. Dr. Hisao Hayakawa. Currently, he is in his 3rd year as a PhD candidate in the same institute under the same supervisor.