PROPOSITION DE STAGE – MASTER 2 DET

Dynamique des fluides, Energétique et transferts
Université Toulouse 3 Paul Sabatier - Toulouse INP - INSA Toulouse - ISAE SUPAERO – IMT Mines Albi

Titre : Effect of 3d roughness on the dispersion of colliding particles transported by a turbulent channel flow

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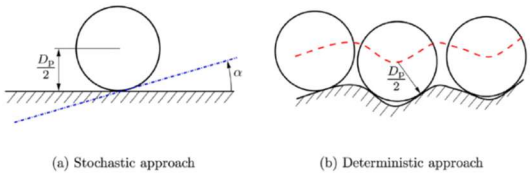
Lieu du stage : Institut de Mécanique des Fluides de Toulouse, Allée du Professeur Camille Soula, 31400 Toulouse, FRANCE

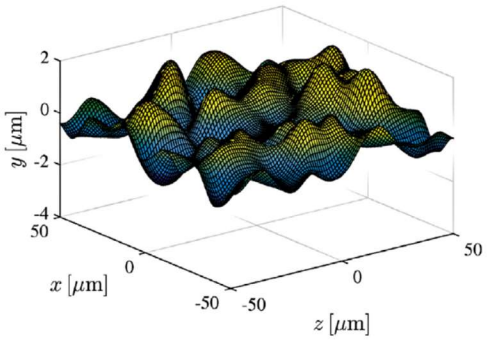
Durée / période : 5 months

Candidature [CV, lettre de motivation, références] à envoyer à : P. Fede (pascal.fede@imft.fr)

Sujet

Particles transported by a turbulent fluid flow is widely encountered in the nature (dune motion, sediment transport, ashes dispersion, …) and in the industry (pneumatic conveying, pulverized coal furnace, powder dispersion, …). Among many other phenomena such as, the particle dispersion by the turbulence, the inter-particle collision, attrition … the particle-wall bouncing can be very important. Since several years, IMFT is developing new boundary condition in order to improve the modelling of the particle-wall interaction in particular for taking into account the wall roughness.





Recently, a new stochastic model has been proposed by Radenkovic & Simonin (2018) for the interaction of spherical particles with a rough wall and the originality lies in the 3-dimensional nature of the model. In the present internship, LES of turbulent channel flows coupled with the Lagrangian tracking of colliding particles will be performed. The new 3d stochastic model will be implemented by the candidate. The results will be interpreted in terms of statistical quantities and will be compared to experimental results from the literature.

The candidate must be interested by the numerical simulation of multiphase flows. Experience with OpenFoam will be appreciated

References

N. A. Konan, O. Simonin, and K. K. D. Squires, Journal of Turbulence, vol. 12, 2011

N. A. Konan, O. Kannengieser, and O. Simonin, International Journal of Multiphase Flow, vol. 35, no. 10, 2009

D. Radenkovic and O. Simonin, International Journal of Multiphase Flow, vol. 109, pp. 35–50, 2018