The Hong Kong Polytechnic University
香港理工大學

Department of Applied Mathematics
應 用 數 學 系

Department of Applied Mathematics Seminar

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Concordia University, Canada

Topic

Refracted Oscillating Brownian Motion

Date| Time

29 August 2025 (Friday) | 11:00 – 12:00 (HK Time)

Venue

Y303

Abstract:

Motivated by problems in stochastic control, we consider the unique solution X to the following SDE

$$dX_t = (\mu_1 1_{\{X_t \le 0\}} + \mu_2 1_{\{X_t > 0\}})dt + (\sigma_1 1_{\{X_t \le 0\}} + \sigma_2 1_{\{X_t > 0\}})dB_t$$

for $\mu_1, \mu_2 \in \mathbb{R}$ and $\sigma_1, \sigma_2 > 0$.

For $\mu_1 = \mu_2$ an explicit expression for transition density of X was obtained by Keilson and Wellner (1978). For $\sigma_1 = \sigma_2$ the transition density was obtained by Karatzas and Shreve (1984). But the transition density for general X was not known.

We first solve the exit problem to process X, and then adopt a perturbation approach to find an expression of potential measure for X. The transition density is found by inverting the Laplace transform.

This talk is based on joint work with Zengjing Chen, Panyu Wu and Weihai Zhang.

ALL ARE WELCOME