A Smoluchowski–Kramers Approximation for the Stochastic Variational Wave Equation

Julien Vovelle

UMPA, CNRS, ENS de Lyon, Lyon, France
julien.vovelle@ens-lyon.fr

Abstract

We investigate the Smoluchowski–Kramers approximation for the one-dimensional periodic variational wave equation with state-dependent damping and additive noise. We show that weak dissipative solutions converge to solutions of a stochastic quasilinear parabolic equation. Joint work with Billel Guelmame.

References

[1] Billel Guelmame and Julien Vovelle. Global dissipative martingale solutions to the variational wave equation with stochastic forcing. *Stoch. Partial Differ. Equ. Anal. Comput.*, 13(1):465–530, 2025.

[2] Billel Guelmame and Julien Vovelle. A Smoluchowski-Kramers approximation for the stochastic variational wave equation. November 2025. preprint hal-0536952.