CHALLENGES IN NUMERICAL ANALYSIS AND DISCRETIZATIONS OF THE DEAN-KAWASAKI EQUATION

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The Dean-Kawasaki equation describes interacting particle systems at the level of empirical densities via a stochastic PDE and plays an important role in statistical physics and stochastic analysis. In this talk, we discuss analytical and numerical challenges, focusing on well-posedness, structure-preserving properties, and discretization methods. We also present extensions to smooth hypersurfaces and briefly outline applications to models in biology and social dynamics.