

# On the existence of solutions for a nonlinear stochastic partial differential equation arising as a model of phytoplankton aggregation.

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## SUMMARY

In this paper, we are interested in the analytical study of a nonlinear Stochastic Partial Differential Equation (SPDE) arising as a model of phytoplankton aggregation. This SPDE has been obtained in previous studies (cf. [3] and [4]) as a continuum limit from an individual-based model that takes into account small scale biological mechanisms for phytoplankton cells such as random dispersal of cells modelled by Brownian motions, mutual interactions between phytoplankton cells due to their chemosensory behavior and the demographical process (cell division and death) modelled by a critical branching process. The obtained SPDE is a diffusion equation with a chemotaxis term and a multiplicative branching noise. We establish the existence of solutions (mild solutions) using weak and tightness arguments.

**Keywords:** Phytoplankton aggregation, Nonlinear stochastic partial differential equation, chemotaxis, Semigroups, Gaussian space-time white noise, Weak convergence, Tightness, Skorohod representation theorem

**AMS Classification:** 60H15, 47D03

## References

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