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**Chemotaxis and cross-diffusion models in complex environments: models and analytic problems toward a multiscale vision.** (English) [Zbl 07544554](#)

*Math. Models Methods Appl. Sci.* 32, No. 4, 713-792 (2022)

This review paper focused on exotic chemotaxis and cross-diffusion models in complex environments. Exotic represents the dynamics of models interacting with a time-evolving external system. In particular, models are derived to describe the dynamics of living systems. First, the derivation of chemotaxis and cross-diffusion models with specific attention to nonlinear characteristics are presented. Further, various exotic models are delivered with the idea of deriving new models. Next, the second part of the paper provides a survey of analytical problems concerning the application of models to the study of real-world dynamics. Finally, the focus shifts to research perspectives within the framework of a multiscale vision, where different paths are examined to move from the dynamics at the microscopic scale to collective behaviours at the macroscopic scale.

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**MSC:**

- [35B36](#) Pattern formations in context of PDEs
- [35B40](#) Asymptotic behavior of solutions to PDEs
- [35B44](#) Blow-up in context of PDEs
- [35K51](#) Initial-boundary value problems for second-order parabolic systems
- [35K57](#) Reaction-diffusion equations
- [35Q35](#) PDEs in connection with fluid mechanics
- [92C17](#) Cell movement (chemotaxis, etc.)
- [91D10](#) Models of societies, social and urban evolution

**Keywords:**

[Keller-Segel](#); [cross diffusion](#); [multiscale problems](#); [pattern formation](#); [complex interactions](#); [blow-up](#); [well-posedness](#); [micro-macro derivation](#)

**Full Text:** [DOI](#)

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