

Preface

The topic of this book is on the crossroad of two of my main research topics: nonlocal mean field-type nonlinear systems and equations with nonlocal diffusion. The motivations for the first topic stem from mathematical physics, in particular electrochemistry and astrophysics. The interested readers will find a panorama of recent results together with (rather technical) proofs of our (mine and my collaborators) original ones. This is a kind of warning: this book is not an introductory text to chemotaxis theory, but rather a collection of new results around global-in-time existence questions versus finite time blowup phenomena for the basic Keller–Segel model. I tried to arrange separate sections in a manner that they can be read independently, so some repetitions are unavoidable.

I am much indebted to my Wrocław colleagues; my teacher and advisor, Andrzej Krzywicki, and my friend, Tadeusz Nadzieja, for introducing me to the topic of mean field models in statistical mechanics. The second topic arose from probabilistic considerations and owes much to Wojbor Wołczyński, with whom we (Grzegorz Karch and me) studied various drift-diffusion equations related to Lévy processes in Cleveland. It is my honor and pleasure to thank all my friends for fruitful collaboration on chemotaxis over years: Waldemar Hebisch, Jacek Dziubański, Danielle Hilhorst, Andrzej Raczynski, Philippe Laurençot, Jean Dolbeault, Maria J. Esteban, Marco Cannone, Ignacio Guerra, Robert Stańczy, Peter A. Markowich, Lorenzo Brandolese, Lucilla Corrias, Gang Wu, Eduardo Elio Espejo, Noriko Mizoguchi, Jacek Zienkiewicz, Tomasz Cieślak, Dominika Pilarczyk, Xiaoxin Zheng (in a chronological order of starting our joint research), with the special affection for Grzegorz Karch.

I am also indebted to Jan Burczak, Miguel A. Herrero, Cyril Imbert, Nikos Kavaliris, Changxing Miao, Régis Monneau, Yūki Naito, Takayoshi Ogawa, Michał Olech, Łukasz Paszkowski, Benoît Perthame, Takasi Senba, Mikołaj Sierżęga, Takashi Suzuki, Juan-José L. Velázquez, Hiroshi Wakui, Gershon Wolansky, and Dariusz Wrzosek for the influence (direct as well as indirect) on other mathematical problems studied.

I also warmly thank Tadeusz Nadzieja for pertinent remarks he offered me after reading a preliminary version of the text. Special thanks are due to Agnieszka Hejna for her help in graphics presentation.

This book would never appear without the encouragement of De Gruyter Acquisitions Editor Mathematics Apostolos Damialis, who convinced me that the topic is suitable for the series “Mathematics and Life Sciences”.

Last but not least, support of NCN (Polish National Center for Research; recently through the 2016/23/B/ST1/00434 project) and other grant agencies (in France, Chile, United States, Austria) is gratefully acknowledged for various projects, including a couple of small, but quite efficient bilateral French–Polish “Polonium” ones we had.

Wrocław
August 2019

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