CIME Course on

**From a Microscopic to a Macroscopic Description
of Complex Systems**

Bedlewo (Poland) - September 4-9, 2006

# Links Between Microscopic and Macroscopic Descriptions

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**Outline:**

1. Preliminaries

   1.1 Semigroups and generators

   1.2 Generalized Kinetic Models

2. Microscopic, Mesoscopic and Macroscopic Models

3. Singular Perturbation Theory; Tikhonov's Theorem

4. Applications

   4.1 Nonlinear Kinetic Theory

   4.2 Population Theory

   4.3 Coagulation and Fragmentation Processes

   4.4 Swarming Processes

   4.5 Chemotaxis, Haptotaxis

   4.6 Tumour Invasion

**Reference**

M. Lachowicz, *On bilinear kinetic equations. Between micro and macro descriptions of biological populations*, Banach Center Publ., 63, 2004, 217-230.

M. Lachowicz, Ph. Laurencot, D. Wrzosek, *On the Oort-Hulst-Safranov coagulation equation and its relation to the Smoluchowski equation*, SIAM J. Math. Anal., 34, 6, 2003, 1399-1421.

M. Lachowicz, *General population systems. Macroscopic limit of a class of stochastic semigroups*, J. Math. Anal. Appl. 307, 2005, 585-605.

M. Lachowicz, *Stochastic semigroups and coagulation equations*, Ukrainian Math. J. 57, 2005, 770-777.

M. Lachowicz, *Micro and meso scales of description corresponding to a model of tissue invasion of tumours*, Math. Models Methods Appl. Sci., 15(11), 2005, 1667-1683