



Contribution ID: 72

Type: **Flash talk**

Combinatorial approach to modeling coagulation phenomena

Monday, 27 September 2021 13:50 (5 minutes)

Coagulation (aggregation) is a phenomenon that consists of combining clusters into larger clusters, with the probability of merging depending on the size (or mass) of these clusters. Such an abstract definition causes that we can find coagulation in a great number of real processes: starting from blood coagulation, through the processes known from food and polymer processing, to the creation of protoplanetary disks (accretion). Several theoretical approaches to the coagulation processes have been proposed over the years. The best-known analytical approach is one based on the Smoluchowski equation [1]. In the presentation, we will briefly discuss solutions that arise from the Smoluchowski equation and present other theoretical approaches (stochastic and combinatorial). The latter, i.e. the combinatorial approach, can be seen as a novelty in the field [2]. We will discuss in detail its requirements and solutions that were recently obtained (e.g., solution for the electrorheological coagulation [3]). These theoretical results were tested against numerical simulations and proved their high accuracy. The current status of the knowledge and open problems in the field will be presented.

References

- [1] P.L. Krapivsky, S. Redner and E. Ben-Naim: A Kinetic View of Statistical Physics (Chapter 5), Cambridge University Press, New York 2010.
- [2] M. Łepek, A. Fronczak, P. Fronczak: Rep.Math.Phys.88(1), 89-113 (2021), Coalescence with arbitrary-parameter kernels and monodisperse initial conditions: A study within combinatorial framework.
- [3] M. Łepek, A. Fronczak, P. Fronczak: Phys.D 415,132756 (2021), Combinatorial solutions to coagulation kernel for linear chains.

Primary author: ŁEPEK, Michał (Warsaw University of Technology, Faculty of Physics)

Presenter: ŁEPEK, Michał (Warsaw University of Technology, Faculty of Physics)

Session Classification: S2