

Global and Exploding Solutions in a Model of Self-Gravitating Systems

Tadeusz Nadzieja (Zielona Gora)

We study properties of solutions of the system

$$u_t = \nabla \cdot (\vartheta \nabla u + u \nabla \varphi),$$

$$\Delta \varphi = u,$$

$$E = M\vartheta + \frac{1}{2} \int_{\Omega} u\varphi \, dx.$$

This system was proposed by CHAVANIS, SOMMERIA and ROBERT for description of evolution of density of a system of gravitating particles. In physical interpretation $u(x, t)$, $\varphi(x, t)$ are the density and the gravitational potential, respectively. The temperature $\vartheta(t)$ is uniform in the domain Ω , where the problem is considered. M is the total mass and E is the energy of the particles. We are interested in the existence of global solutions, blow-up phenomena and stationary solutions of our system.

The results have been obtained jointly with PIOTR BILER (Uniwersytet Wrocławski) and IGNACIO GUERRA (Universidad de Chile).

References

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