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*Regularity of the Boltzmann equation in bounded domains*

**Abstract**

The Boltzmann equation models the dynamic of non-equilibrium rarefied gases. Despite extensive developments in the study of this equation, many basic questions regarding solutions in a physical bounded domain, such as their regularity, have remained largely open. This is partly due to the characteristic nature of boundary conditions in kinetic theory and to the non-local mixing of the collision operator. To show this effect, we consider the Boltzmann equation in a bounded domain with diffuse reflection at the boundary. The solution is known to present a singular behavior on the grazing trajectories. In the case of a strictly convex domain, the singularities happen specifically on the (grazing) boundary and Sobolev regularity of the solution can be proved. In the case of a non-convex domain, the singular trajectories cross the domain and the singularity propagates in the domain: in this case only BV regularity can be proved. A glance on other boundary conditions will be given.  This is a joint work with Yan Guo, Chanwoo Kim and Ariane Trescases.