



Dr. Giuseppe Stracquadanio

Research Areas:

My research activity focuses on the study and implementation of high order accuracy numerical methods for the solution of BGK models in the frame of kinetic theory of rarefied gases. The BGK equation governs the evolution in the phase space of the distribution function of a monatomic gas, and it is a consistent approximation of the Boltzmann equation. The numerical method that I have developed is based on a semi-Lagrangian formulation that allows us to use large time steps.

I am currently studying some applications and extensions of these numerical schemes. I have implemented the one dimensional (in space and velocity) problem and the 3D (in velocity) problem. The method has been also extended to two different BGK models for mixtures of inert and reactive gases; reflective and Maxwellian boundary conditions have been also included, with high order treatment of the boundary. Additional extensions will involve equations of Vlasov-BGK type for mixtures of plasmas.

Which factors are important to develop strategies that do not only improve our current situation immediately, but also lead to a sustainable change?

Global changes are phenomena involving long time and small interventions limited in time cannot solve problems or reverse trend. Cooperation between nations and their research institutions must be incremented. Obviously this is not enough. I believe that every single man, woman, child, must be most involved on the issue in order to fight all together. Only when each of us will give his small contribution, then, sustainable changes will be really applicable and achievable.

Which specific contribution does your scientific discipline offer to understand the most important global changes better?

Mathematical model that describe global changes are ruled by non-linear partial differential equations, often not easy to solve. The outcome of my scientific research is to give a numerical tool that is useful to solve numerically hyperbolic PDEs with source term. In this way it is possible to make more accurate computer simulations about phenomena involved in global changes.