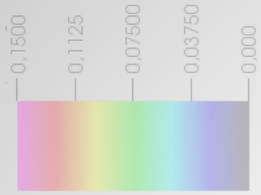
Università degli Studi di Roma
Tor Vergata

DF – Dipartimento di Fisica – Macroarea di Scienze MFN
DII – Dipartimento di Ingegneria dell'Impresa "Mario Lucertini"

25 Giugno 2019 - Aula Convegni
Ore 14:30

A central-moment multiple-relaxation-time collision model



Prof. Xiaowen Shan, PhD

Professor and Department Head

South University of Science and Technology of China

Aiming at systematically correcting the non-Galilean-invariant thermal diffusivity in the previous multiple-relaxation-time Boltzmann equation collision model [Shan & Chen, Int. J. Mod. Phys. C, 18, 635, (2007)], we show that by separately relaxing the central moments of the distribution function, Chapman-Enskog calculation will yield correct hydrodynamic equations with mutually independent, Galilean invariant viscosity and thermal diffusivity, provided that the velocity-space discretization preserves moments up to the fourth order. By transforming the central moments back to the absolute reference frame and evaluating using fixed discrete velocities, the efficient and accurate streaming-collision time-stepping algorithm is preserved. The LB model is found to have excellent numerical stability in high-Reynolds numbers simulations.

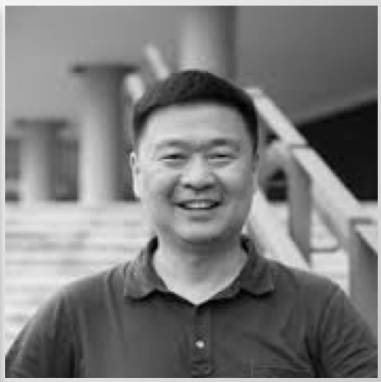
Prof. Xiaowen Shan received his BS and MS degrees from Beijing University in 1985 and 1988, his Ph. D. degree from Dartmouth College in 1991. From 1991 to 1998 he worked at **Los Alamos National Laboratory**, first as a postdoc fellow and then a research staff.

From 1998 to 2005 he was a software engineer at **Microsoft Corp.**, and from 2005 to 2012 a Senior Director at **Exa Corporation**.

In 2012 he joined Commercial Aircraft Company of China (**COMAC**) as Director for Aerodynamics in COMAC's Beijing Research Center.

Since 2016 he has assumed his current position as **Full Professor and Head of Department at South University of Science and Technology** (SUSTech), in China.

Prof. Shan is best known for the **Shan-Chen non-ideal gas lattice Boltzmann model**. His work in establishing the connection between lattice Boltzmann method (LBM) and classic kinetic theory laid a concrete foundation for the modern development of LBM, for which he was elected a **Fellow of American Physical Society in 2009**. At COMAC, Prof. Shan's research interest is mainly around aerodynamics and aircraft design. He led the preliminary research and design for China's lnext generation ong-range wide-body commercial aircraft. Dr. Shan published more than 60 research papers, which accumulated 7000+ citations, and is the holder of four US patents.



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