Computational & Analytical Combustion Group

Principle Investigator: **Dr. V'yacheslav (Slava) Akkerman**
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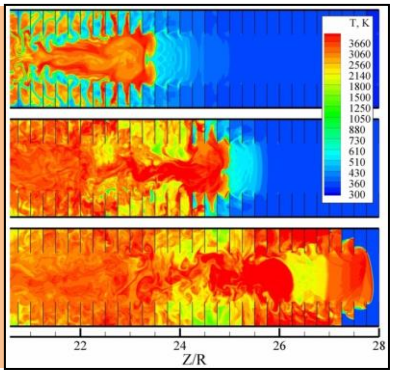

Dr. Akkerman, an Assistant Professor of Mechanical and Aerospace Engineering at West Virginia University considers potential Graduate Research Assistant(s), either at the M.S. Candidate or Ph.D. Candidate level, willing to join his team and proceed in one or more of the research directions listed below, as well as in other concomitant research fields. Interested self-motivated, hard-working enthusiasts with excellent computational and analytical skills are very welcomed to contact Dr. Akkerman directly.

Motivation

Often a useful tool, but occasionally the cause of disasters, fire has accompanied mankind for millennia. Protecting our ancestors from the coldness, darkness, predators and stomach bacteria, combustion has brought primitive, tribal humans into the modern industrial society. In spite of the modern striking achievements in alternative/renewable energy such as solar, wind, and geothermal, as well as nuclear fission/fusion, about 85% of all energy we use today is still a direct result of burning, and combustibles will likely remain the dominant source of energy for industry, heating and transportation in the foreseeable future, which strongly motivates continued interest in combustion research.

PI's Credentials:

V'yacheslav Akkerman graduated with distinction from Moscow Institute of Physics and Technology, Russia, with B.Sc. (2001) and M.Sc. (2003) degrees in Applied Mathematics and Applied Physics, and received his Ph.D. in Theoretical/Nonlinear Physics from Umeå University, Sweden, in 2007. He also holds a Philosophy Licentiate degree from Umeå University and a Candidate of Science (Ph.D. equivalent) degree from the Nuclear Safety Institute of the Russian Academy of Sciences. Dr. Akkerman was a postdoctoral fellow in the Center for Turbulence Research at Stanford University in 2007–2008, and a professional research staff member in the Department of Mechanical and Aerospace Engineering at Princeton University in 2008–2012. He accepted his current faculty position at West Virginia University in August, 2012. In 2003–2013, Dr. Akkerman has published about *40* peer-reviewed journal articles.

Potential Research Directions:

Dr. Akkerman's research interests and expertise include (but not limited to) several interconnected problems in combustion science: intrinsic flame instabilities; turbulent burning; flame interaction with acoustics, shocks, combustor walls and interior obstacles; and flame acceleration with particular interest in deflagration-to-detonation transition (DDT). The last item lies behind countless disasters in rockets, power plants and mines, although it can also be constructively utilized in such combustion devices as the pulse-detonation engine.

Specifically, Dr. Akkerman and his colleagues have quantified turbulent flame speeds and analyzed self-similar acceleration of expanding flames in free space; revealed several distinctive stages within the DDT scenario in micro-tubes/channels; developed theories that describe the propagation dynamics and morphology of a flame front; and substantiated the theories through numerical simulations. Dr. Akkerman works also on the extensions of the combustion theory to astrophysics, plasma physics, as well as the pseudo-hydrodynamic phenomena in organic optoelectronics, crystals of nanomagnets and other advanced materials.