

Transient Heat transfer effects in low-fluence Laser Induced Incandescence

Farzan Memarian and Kyle Daun

*Department of Mechanical and Mechatronics Engineering, University of Waterloo,
Waterloo, Canada*

Recent time-resolved laser-induced incandescence (TiRe-LII) experimental studies have revealed anomalies in particle cooling rates that cannot be explained using steady-state conduction models. This is the first study to use Direct Simulation Monte Carlo (DSMC) to investigate possible transient effects in heat conduction between the laser-energized particle and surrounding gas. While the transient DSMC results reveal an increased cooling rate shortly after the laser pulse, this effect is small relative to experimentally-observed anomalous cooling.