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Simulating the Effect of Flame Retardant Materials on Heat Diffusion in Polymers JOSEPH ORTIZ, Department of Materials Science & Engineering, Stony Brook University, ARPON RAKSIT, Commack High School, DILIP GERSAPPE, MIRIAM RAFAILOVICH, Department of Materials Science & Engineering, Stony Brook University — Many commonly used polymers have low ignition temperatures, presenting the dangers of combustion and thermal degradation. Research is being done on the use of flame retardants, yet not much is known about the physics of heat loss due to these materials. Simulating the effect of flame retardants on the spread of heat throughout a polymer may provide a better understanding on how to effectively manipulate and make use of flame retardant materials. Using the lattice Boltzmann method, an algorithm that models the physics of fluid dynamics, a basic simulation of heat diffusion from a heat source to sink was implemented in three dimensions. The polymer and flame retardant material were incorporated into the system by implementing ignition within the particles of the polymer and by adding heat absorbing microscale filler particles within the polymer matrix. By manipulating the volume fraction of flame retardant particles, their ability to absorb heat, and their efficiency in removing heat from the system, different degrees of polymer combustion were simulated while polymer systems ranged from single polymer systems to multi-component blends.

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