1067-65-2038   **Edward W. Swim*** (`edward.swim@shsu.edu`) and **Mark P. Adams**. *Stochastic models for heat flow in a cylinder.* Preliminary report.

An immense amount of heat is produced whenever large weapons are fired and may even cause gun barrels to overheat. Over time, this results in damage to the gun barrel, often in the form of cracks and erosion. In order to simulate this process, current methods focus on the use of differential equations that provide a deterministic model for the velocity, pressure, and temperature of gases and residue generated by the burning propellant. However, it is clear that random variations exist within each round fired. This research will investigate the value of including stochastic components within the thermodynamic equations used to simulate heat flow within the cylindrical cannon bore. Under assumptions of cylindrical symmetry, a perfect gas, and constant thermal conductivity, we construct a model based on conservation laws and utilize white noise in order to simulate the random behavior of our heat source. Finite difference methods are then applied to compute solutions to the resulting stochastic boundary value problems. (Received September 22, 2010)