1086-60-1274 **Edward J. Allen*** (edward.allen@ttu.edu), Department of Mathematics and Statistics, Texas Tech University, Lubbock, TX 79409-1042. *A Stochastic Analysis Of Power Doubling Time For A Subcritical System.*

For a subcritical nuclear reactor, power doubling time is a theoretical and practical concept, useful for example, in certain reactor start-up operational procedures. Suppose that the control rods are positioned so that the reactor is subcritical and the reactor power, originating from decay of radioactive material in the core, is in equilibrium. Now suppose that the control rods are withdrawn a certain distance so that the reactor stays subcritical but the new equilibrium power level is twice the original level. The time it takes for the power to reach the new equilibrium level is the doubling time. Although power doubling is a widely recognized phenomenon, it is identified in the present investigation as a stochastic first-passage time problem. Using stochastic point kinetics equations that model the dynamic behavior of a nuclear reactor, relations for the mean doubling time and the standard deviation in doubling time are derived. It is shown that the power doubling time for a subcritical system is independent of whether the system is fast or thermal, weakly depends on source strength, and is approximately proportional to the inverse of the reactivity for small negative values of the reactivity. (Received September 20, 2012)