Abstract Submitted
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Simulating an Exploding Fission-Bomb Core CAMERON REED, Alma College — A time-dependent desktop-computer simulation of the core of an exploding fission bomb (nuclear weapon) has been developed. The simulation models a core comprising a mixture of two isotopes: a fissile one (such as U-235) and an inert one (such as U-238) that captures neutrons and removes them from circulation. The user sets the enrichment percentage and scattering and fission cross-sections of the fissile isotope, the capture cross-section of the inert isotope, the number of neutrons liberated per fission, the number of "initiator" neutrons, the radius of the core, and the neutron-reflection efficiency of a surrounding tamper. The simulation, which is predicated on ordinary kinematics, follows the three-dimensional motions and fates of neutrons as they travel through the core. Limitations of time and computer memory render it impossible to model a real-life core, but results of numerous runs clearly demonstrate the existence of a critical mass for a given set of parameters and the dramatic effects of enrichment and tamper efficiency on the growth (or decay) of the neutron population. The logic of the simulation will be described and results of typical runs will be presented and discussed.

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