Abstract Submitted
for the TSF09 Meeting of
The American Physical Society

Chaos and the 3-Body Problem BILLY QUARLES, MANFRED CUNTZ, UT Arlington — The Circular Restricted 3-Body Problem (CR3BP) has been studied for many years. Classically it has been shown to potentially lead to chaos. However, instability and chaos are not synonymous. In exploring numerically the orbits in the CR3BP, we seek to establish criteria by determining which initial conditions will produce stable orbits, stable chaotic orbits, or unstable orbits. Using Java programming, we produced software based on computational algorithms to calculate and visually animate the orbit of the 3rd smaller body. Our software operates in a rotating reference frame allowing a clear visual representation of the planetary orbit. After establishing criteria for the short term, we look to further establish the long term stability by the use of Lyapunov exponents. By finding long term stable orbits in the CR3BP, we may be able to predict more exotic extra-solar planetary orbital configurations than what has already been observationally established.

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Date submitted: 30 Sep 2009 Electronic form version 1.4