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Test of the Hill Stability Criterion against Chaos Indicators SUMAN SATYAL, BILLY QUARLES, University of Texas at Arlington, TOBIAS HINSE, Korea Astronomy and Space Science Institute — The efficacy of Hill Stability (HS) criterion is tested against other known chaos indicators such as Maximum Lyapunov Exponents (MLE) and Mean Exponential Growth of Nearby Orbits (MEGNO) maps. First, orbits of four observationally verified binary star systems: γ Cephei, Gliese-86, HD41004, and HD196885 are integrated using standard integration packages (MERCURY, SWIFTER, NBI, C/C++). The HS which measures orbital perturbation of a planet around the primary star due to the secondary star is calculated for each system. The LEs spectra are generated to measure the divergence/convergence rate of stable manifolds and the MEGNO maps are generated by using the variational equations of the system during the integration process. These maps allow to accurately differentiate between stable and unstable dynamical systems. Then the results obtained from the analysis of HS, MLE, and MEGNO maps are checked for their dynamical variations and resemblance. The HS of most of the planets seems to be stable, quasi-periodic for at least ten million years. The MLE and the MEGNO maps also indicate the local quasi-periodicity and global stability in relatively short integration period. The HS criterion is found to be a comparably efficient tool to measure the stability of planetary orbits.

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