# Close approaches while performing accurate N-Body simulations

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N-body simulations of the Sun, the Jovian planets Jupiter, Saturn, Uranus, Neptune and small bodies are used extensively to model the evolution of the Solar System. The Sun and planets are represented as massive bodies and the small bodies as massless ones. The massive bodies act upon one another and upon the massless bodies but the massless bodies do not interact among themselves.
In most such simulations, a small body is removed from the simulation if it makes a close approach to the Sun or a Jovian planet. We present numerical comparisons of new and existing algorithms for detecting close approaches when performing accurate simulations. The comparisons are made on problems with up to 1000 small bodies.