

## The restricted $2 + 2$ body problem and the capture of irregular moons

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### SUMMARY

Giant planets, like Jupiter, have a large number of moons, most of them of small size and exhibiting an irregular behavior. Indeed, they move, mainly, in retrograde orbits with moderate eccentricities. These facts suggest a different origin than the regular moons, greater in size and orbiting the planet in almost circular prograde orbits, close to the equatorial plane. The most feasible explanation is that irregular moons formed in another place of the Solar System and then captured by giant planets. To explain the capture mechanism, several models have been proposed. Most of them are similar, but with slight differences from one another. In this presentation we propose a model based on the so called chaos assisted capture. In particular, we consider a restricted  $2 + 2$  body problem with two primaries revolving in circular orbit and two small masses do not affect the motion of the primaries. While one of the small bodies is temporally captured in a chaotic layer by the giant planet, the other one acts as an intruder. If they are close enough, in their motion around the giant planet, an energy exchange could take place that permanent captures one of the bodies. Numerical simulations show that the capture is possible both for prograde and retrograde orbits.

**Keywords:** Restricted  $2 + 2$  body problem, irregular moons, capture dynamics.

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