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On the detectability of quasi-circular co-orbital planets. Application to the radial velocity technique.

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Abstract

Several celestial bodies in co-orbital configurations exist in the Solar System. However, co-orbital exoplanets are yet to be discovered. This lack may result from a degeneracy between the signal induced by co-orbital planets and other orbital configurations. Here we determine a criterion for the detectability of quasi-circular co-orbital planets and develop a demodulation method to bring out their signature from the observational data. We show that the precision required to identify a pair of co-orbital planets depends only on the libration amplitude and on the planet's mass ratio. We apply our method to synthetic radial velocity data, and show that for tadpole orbits we are able to determine the inclination of the system to the line-of-sight. Our method is also valid for planets detected through the transits or astrometry techniques.