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Title: Planet-Disk Interaction and Final Orbital Assembly of Planets in Circumbinary Disks
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Abstract: Planet-Disk Interaction and Final Orbital Assembly of Planets in Circumbinary Disks

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One of the most significant observations made by the Kepler space telescope is the detection of several confirmed circumbinary planets. In these systems, the detection of multiple, individual eclipses between the stars and the planet points to the coplanarity of these systems where the orbital plane of the binary and that of the planet coincide. The flatness of these systems gives strong support to the idea that circumbinary planets are formed in circumbinary protoplanetary disks. The closeness of some of these planets to the unstable region around the binary suggests an evolutionary scenario where the planets are formed at larger distances and migrated to their present orbits. We have follow-up on this scenario and have carried out extensive numerical hydrodynamical simulations of planet-disk interactions in circumbinary disks with embedded planetary bodies. Simulations have been performed for infinitesimally thin disks with a locally isothermal equation of state, as well as radiative simulations where viscous heating is balanced by radiative cooling. For both cases, the equilibrium disk structure is calculated around the binary stars using long-time evolution simulations. We considered planets to be embedded in these disks and simulated their evolutions under the influence of the disk forces. We find that the planets migrate inward and their orbits are typically settled near the inner rim of the disk (the stability limit), in good agreement with the results of the observations. We present the results of our simulations and discuss its applications to the currently know circumbinary planetary systems. As an example of an eccentric binary, we will also present the results of our simulations for the planetary system of Kepler 38 where the binary eccentricity is 0.1 and the planet revolves the binary in a circular orbit close to the binary stability limit.