

Poster

Splinter Exoplanets

ORBITAL PARAMETER ESTIMATION OF EXTRASOLAR MULTI-PLANET
SYSTEMS BY TRANSIT TIME VARIATION

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Transit Time Variation (TTV) is the earlier or later occurrence of a planetary transit across the stellar disk relative to the time of a reference transit. TTV is dominantly caused by third body orbit perturbations by attracting forces acting on the transiting planet by at least one another planet inside or outside of the orbit of the known transiting planet. Gravitational interactions perturb the velocity of the transiting planet in its orbit which manifests in a periodical perturbation of the revolution period. Measurements of the transit times and the identification of differences from a mean transit period may prove the existence of further planets. The TTV is therefore a tool to confirm planetary candidates in multi-planet systems. Even non-transiting planets can be detected by the analysis of the TTV of a transiting planet. Their orbital elements can be estimated if the TTV is sufficiently resolved. The shape of the TTV curve, the sequence of the individual transit time differences as a function of observing time, depends on the orbital elements of the planet(s) in the system and may show very complex structures. Upcoming spaced-based surveys will observe various stars for which the usual planetary mass determination by ground-based radial velocity observation is not always possible. TTV is an alternative method for orbit determination which uses only the information from the light curve.