Transit light curve modeling and analysis

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A set of transit light curves from the CoRoT[1] database is analyzed in the course of the development of an IDL code, which combines different methods, enabling the characterization of the transit light curve concerning transit system parameters and effects emerging in the star-planet system. The major part of the analysis is done using an IDL code which is based on various routines developed by Mandel and Agol (2002), Weingrill (2011), as well as those included in the Markwardt IDL Library (Markwardt, 2008). The goal is to process the CoRoT data, calculate light curve models and to check for the effects of star-planet interactions.
Furthermore, for the detailed investigation of the transit light curve, John Southworth's (Southworth et al., 2004a, b; Southworth, 2008) JKTEBOP[2] code is used with the aim to gain a precise transit model with reliable values representing the transit parameters. Special attention is paid to the different limb darkening coefficients (LDCs), making use of both John Southworth's JKTEBOP and JKTLD[3] codes to focus on the different limb darkening laws resulting in various LDCs, which have an impact on the transit light curve (Southworth, 2008).
For further analysis concerning effects in the star-planet system, which may be seen in the transit light curve, the IDL code is taken to subtract the transit model fit from the light curve. This step is done in order to be able to detect relatively weak features caused by star-planet interactions, such as the ellipsoidal effect (Mazeh et al. 2010), stellar activity (Weingrill, 2011) or exomoons (Tusnski, 2011) using wavelet analysis software and the so-called "5-parameter-model" from Mazeh et al. (2010).

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