
Kepler and the Long Period Variables

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Abstract

High precision Kepler photometry is used to explore the details of AGB light curves. Since AGB variability has a typical time scale on order of a year we discuss at length the removal of long term trends and quarterly changes in Kepler data. Photometry for a small sample of eight SR AGB stars and one RV Tauri star are examined using the 30 minute cadence over a period of 45 months. While undergoing long period variations of many magnitudes, the light curves are shown to be smooth at the millimagnitude level over much shorter time intervals. No flares or other rapid events were detected on the sub-day time scale. The shortest AGB period detected is on the order of 100 days. The shortest period detected is a 24.9 day period for the RV Tauri variable DF Cyg. All the SR variables in our sample are shown to have multiple radial modes. This is always the first overtone typically combined with the fundamental. A common characteristic of SR variables appears to be the simultaneous excitation of multiple closely separated periods for the same overtone mode. The light curves were all well represented by a combination of sinusoids. However, the properties of the sinusoids are time variable with chaotic variations present at low level. No non-radial pulsations were detected. It is argued that the long secondary period variation seen in many SR variables is linked to stellar structure.

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