LinOccult - application for calculating star occultations by minor planets

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Observations of stellar occultation by asteroids will make significant impact in several areas of astronomy. Observations of these events by professional and amateur astronomers are extremely important since they can provide unique information about the size of asteroids and improve their orbit elements dramatically. To predict such events **LinOccult** has been developed. The main purpose of **LinOccult** is to calculate time and location of star occultation by minor planets. **LinOccult** has been developed for Linux operation system and may be ported to other UNIX-based operation systems. Stability and reliability of Linux allow **LinOccult** to process all known minor planets from astorb.dat. Unlike most propriety source applications, **LinOccult** is distributed as an Open Source application under GNU General Public License. This license allow everybody to study algorithms implemented for calculating occultation events, add new features e.g. output results to different formats and fixing bugs in source code.

Current **LinOccult** release works in two modes. In the first mode **LinOccult** select asteroids from astorb.dat by using parameters from config files (e.g. minimum and maximum asteroid semimajor axis) and calculate all occultation events for selected asteroids and given period. Such calculations may take hours and even days especially for long period. To improve performance and accuracy of calculations **LinOccult** use major planets positions from DE405 files when calculating minor planet orbit perturbations. When minor planet orbit has been calculated **LinOccult** create Chebyshev approximation of the orbit and trying to find occultations of neighbor stars. In second mode **LinOccult** calculate occultations for one asteroid. In this mode user is able to set exact asteroid orbit elements such as mean anomaly, inclination, eccentricity and others in config file. **LinOccult** has more then thirty parameters which allow **LinOccult** to be very flexible in processing asteroids. In particular user may set different star catalog in config file. **LinOccult** is able to output results in different format - as a list of points, in a 3D Earth surface (by using PovRay - 3D rendering engine and Earth-

View packet), as an input format for OziExplorer to show occultation path in the maps.

Future releases will include the following improvements:

1. Fast searching of neighbor stars algorithm. This feature will significantly improve **LinOccult** performance.

2. Storing results in database for fast search occultations events.

3. Creating user-friendly GUI.

LinOccult source code and calculation results can be found in the following sites:

1. *http://linoccult.sourceforge.net*

2. *www.newtech.ru/~andyp*