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«VARIABLE STARS – 2001»

ABSTRACTS

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In the attached volume the Abstracts of scientific contributions are presented. The contributions have been submitted to the International Scientific Conference "Variable Stars - 2001", dedicated to the memory of Professor V.P.Tsessevich (1907-1983) and 130th anniversary of the foundation of the Astronomical observatory of the I. I. Mechnikov Odessa (formerly Novorossijskij University) national University.

The Abstracts are given in accordance with their scientific topics, announced in the program for 8 specific sections (see their ennumaration below). The main topics of the conference reflect modern trends in investigation of variable stars of different types and in elaboration of new equipment and methods of mathematical modeling.

As a rule, Abstracts of the contributions in question, within a given section are displayed in an alphabetic order, by the name of the first author. Abstracts are presented in English without any supplementary editing and with no subdivision into plenary, section or poster contributions.

The volume is supplemented with the Content and the full list of the contributors.

SCIENTIFIC TOPICS:

- Interacting binary stars
  Convenors – V. G. Karetnikov, I. B. Pustylnik
- Pulsations: from seconds to years
  Convenors – N. N. Samus', P. Whitelock
- Eruptive stars
  Convenors – I. L. Andronov, R. E. Gershberg
- Variable Radio Sources
  Convenors – A. A. Konovalenko, M. I. Ryabov
- Microlensing variability, exoplanets, exostars
  Convenors – M. E. Prokhorov, A. V. Yushchenko
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- Stellar atmospheres
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- Astronomical Software, Instrumentation and Large Dtabases
  Convenors – V. P. Epishev, V. P. Pozigun
- Astronomical Summer School for Young Scientists
  Convenors – N. G. Bochkarev, M. I. Ryabov

The organizers of the conference:
The Department of Astronomy and Astronomical Observatory of the Odessa National University, Euro-Asian Astronomical Society (EAAS), Ukrainian Astronomical Association (UAA), Odessa Astronomical Society (OAS).
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UNCONTROLLED EARTH ARTIFICIAL SATELLITES (EAS) AS INDICATORS OF PHYSICAL PROCESS IN SPACE

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The rotation of Earth artificial satellites (EAS) have permanent influence of perturbation of different physical fields. The heigh accuracy of determination of owner rotation and orientation of EAS allows to estimate the changes of the value of such influence during deily and less time intervals. These changes are smaller then ones in case on investigation of changes of EAS orbit elements. The numerical estimations of change of solar radiation power on EAS are serried ont to EAS of "Midas" series. These space objects have enough complicated forms and located at altitudes of more than 3500 km. Our calculatons are based on elektrophotometric and positional jbservations of EAS.

NEWLY CONFIIGURED ABERRATION CORRECTOR FOR 2-MIRROR TELESCOPE WITHOUT ASPHERIC SURFACES

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A 1-meter telescope, which is under construction at Odessa observatory, has got long ago a main spherical mirror with Cassegrain's focus, for which P.P.Argunov has developed an corrector of spherical aberration and coma. This corrector is made of 2 lenses and a convex mirror. All surfaces are spherical. With the relative focus 11,2 an estimated aberration spot in the center is behind 60 microns, whereas the distance of 15 arc minutes – makes 180 microns. These feature may have been OK for photoelectrical observations of 60s.

Modern light-receivers need higher aperture ration and better quality of aberration images than the one achieved by system. Optimization of its optical scheme at the relative focus 9, brings to spot formation up to 130 microns, whereas at the field edge – 140 microns. A reason is at the bottom of spherical aberration, which depends on the 3 power of relative focus.

As it turned out, the P.P.Argunov's 2 lenses corrector has got one extra correction parameter, which is only applicable exactly against this aberration. Computer-based estimates allowed to significantly improve image quality both in field center and at the matrix edge up to 7-8 microns, whereas at the distance 15 arc minutes from center – up to 90 microns within broad bandwidth (from line C till h). This became possible by altering the previous corrector's configuration, i.e., – by turning over the front lens.

From outside our corrector looks like a composite meniscus. Its auxiliary advantages are compactness, self-adjustment and high protection of inner surfaces against dust and sweat. Image reflections do not establish false images.

IMPROVEMENT OF CORRECTOR OF ASTRONOMIC TELESCOPE STRAIGHT FOCUS

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Main focus of paraboloid is overburden with off-axial aberration and can not ensure equally consistent images even with single CCDs – image detector. Thus, taken with no atmospheric noise, a 1 meter parabaloid (A=1: 3) will depict at the edge of only 10mm large CCD a star having an aberration spot bigger than 200 microns. Apparently, a sphere or hyperbola will add a spherical aberration, so that the end-result will be more worse.

To increase usable field of vision, a lens correction of aberrations is being applied and there are few type of main focus correctors are developed. Consistent result is received with application of corrector with 3 space apart components – lens or aspherical plates. They are however complicated in assembling and unstable in the use. Simplified solutions, i.e. 2 lenses correctors are known, e.g. developed in 30s, Ross corrector to parabaloid, but it make no proper performance with high-aperture mirrors. Thus, because of residual spherical aberration, the above 1m parabaloid implemented with Ross corrector does not make spots smaller than 100 microns, even in the field center – the place where single mirror performs excellent images.

However, 2 lenses corrector is capable of inducing 3 main types of aberrations, that are spherical, chromatic and coma, but also it has a positive result over the residual spherical aberration. Owing to this feature, a Ross corrector is due to modernization. At the time of its development, computation techniques were narrow and the option invented by Ross was far from optimal, though it was applicable to low-aperture mirrors of those times.

Thanks a computer application, which sorts-out various options of 2 lenses corrector, it became possible to finf the best option for high-aperture mirrors. Our computations of the corrector showed that we can limit an aberration spot in the center to 16 microns in the broad wave lengths from line C to line h. At the CCD's edge, a spot with the same wavelenght will only be 20 microns. These estimated spots are well compliant with the size of a sensing element of CCD.

2 lenses corrector is also calculated for hyperbaloid. It offers even better results.

THE NONSPHERICAL-SYMMETRIC ATHMOSPHERE AND ITS INFLUENCE ON MEASUREMENTS OF DISTANCE TO EARS

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Numerous formulas have been developed which can partially correct range measurements for the effects of atmospheric refraction. For many aplications such as the measurement of continental drift, fault motion and othe

tectonic processes, position accuracies of better than a few centimeters are reguires. These formulas all assume the atmospheric refractivity profile is spherically symmetric. This assumption holds only approximately even for the normal state of the troposphere. The results indicate that the horizontal gradients introduce an rms error of approximately 3-5 cm when the satellite is near 20 gr elevation. The rms error decreases to a few millimeters near zenith. Range resolution of 1 cm or less appears feasible for satellite elevation angles above 20 gr. Below 20 gr, the determination of the range correction from simple meteorological observation to within a centimeter seems to be impossible. However, it may be possible to partially compensate for the systematic horizontal gradients by using additional surface measurements obtained at other location around the laser site.

COMPLEX OBSERVATIONS OF ARTIFICIAL SATELLITES

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It's necessary to conduct the complex observations of the artificial satellites (i.e. photometric, polarimetric, laser ranging etc.) to obtain the full information about observed objects. And the results of observations are most usefull when they are obtained from a same station. That's why the complex observations station was organized in Lviv. It provides the next kind of observations: laser ranging on the telescope TPL-1M and electrophotometric observations on the base of guiding mount LD-2. Now on the installation of developed instrumentation for polarimetric observations is going on.

ELABORATION OF THE BATCH OF THE PROGRAMS BY CELESTIAL MECHANICS FOR THE COMPUTATION OF THE ASTRONOMICAL EPHEMERIS

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The batch of the programs by celestial mechanics are elaborated in order to obtain the ephemeris of the Sun, the Moon, the planets and their satellites, the asteroids, the comets, the binary stars, the variables stars, determination of the conditions of the visibility these the celestial bodies in the any point of the surface of the Earth, as well as predict of the astronomical phenomena's at the celestial sphere and their circumstances as for the Earth on the whole also for given point Earth's surface at the temporal interval about 5000 years in the past and the future.

When calculation of the ephemeris of the celestial bodies have primary meaning spare to informatively of the programs. The high informatively of the programs of the given batch permit comprehend the great variety of the astronomical phenomena's by ephemerid, universal, zonal and legal time of the any station. Also have possibility determine the physical ephemeris of the Sun, the Moon, and the major planets.

The results of calculations take out as the form of the tables also in the form graphic. The base data of the batch contain the orbital elements of the 50 bright asteroids and 100 comets. The coordinates of the 1500 stars, contain in the base data of the batch, permit to get the star catalogue and the map of the sky for any epoch at the temporal interval about 30000 years in the past and the future. At the map of the sky show the geocentrical and the topocentrical positions of the Sun, the Moon and the planets on the given moment of the time, as well as the visible roads of the their motion. Are represent the phases of the Moon and the planets, the pictures of the solar and lunar eclipses. Are draw the geographical maps of the zones of the visible of the solar and lunar eclipses, the occultations of stars and planets by the Moon, the passages of planets on the disk of the Sun. Are show the pictures of the schemes of the motion of the objects for the lunar eclipses, the passages of planets on the disk of the Sun and the systems of the satellites of the planets.

The results, are give by this batch of the programs, was permit the author do begin the annual issue of the collection of the scientific-popular articles "The Odessa Astronomical Calendar" (OAC) from 2000 in common with the Astronomical Observatory of the Odessa National University. These results are publication in the main part of the OAC and are intended for the amateurs of astronomy and the professional workers of southern locale of Ukraine.

ON ERRORS IN THE PRACTICE OF OBSERVATIONS AND THE REDUCTION OF OBSERVATIONS

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Cause of pecularity of astronomical object also can be errors in the identification of object by observations, a formulae of reduction, and noncorrect use of software. For each of these errors we give an example, including the error in the known manuals on the astrophysics.