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*Research Note*

# Nice Observatory CCD measurements of visual double stars (3rd series)

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**Abstract.** We present the measurements of 58 visual double stars made in 1999 and 2000 with the 50 cm refractor of the Nice Observatory and attached CCD camera, using an algorithm based on the adjustment of a tridimensional mathematical surface (Table 1). 2 new binaries discovered by Hipparcos were measured.

**Key words.** astrometry – stars: binaries: visual

## 1. Introduction

We present the results of measurements of binaries made at the Nice Observatory, including pairs rarely measured since their discovery and also double stars measured or discovered by the Hipparcos satellite.

## 2. Image acquisition

We used a Hi-SIS22 CCD camera mounted on the 50 cm refractor (Gili & Couteau 1997).

The camera consists of a 768 × 512 square pixel detector, of side 9 $\mu$m. Its field on the sky is 0.12″. The theoretical resolving power of the instrument (1.22 $\lambda$/D) is 0.33″ (at 0.68 $\mu$m, the highest sensitivity of CCD sensors).

Images were acquired with a focal length of 15.349 m using a Barlow 2× lens (see Salaman et al. 1999, 2000). The focal length was checked on wide pairs measured by the Hipparcos satellite.

The program of acquisition was QMIPS32 (Buil C. et al. 1997, QuickMips32 V. 1.8). For each binary, 10 to 15 images were recorded with integration times ranging from 0.02 to 1 s.

During our two missions, in 1999 from July 9th to 20th and in 2000 from May 3rd to 16th, the images of 58 binaries were acquired.

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**Table 1.** Measurements of visual double stars (this table is only available in electronic form at the CDS via anonymous ftp to cdsarc.u-strasbg.fr (130.79.128.5) or via http://cdsweb.u-strasbg.fr/cgi-bin/qcat?J/A+A/369/552)

## 3. Reduction method and results

The acquired images are visually sorted, by eliminating those showing important distortions. The selected images are composited (shift and add) using MIPS software (Buil C. et al. 1993, Mips V. 1.02). We verify that the $FWHM$ does not exceed a maximum of 1.2″.

To measure composite images, we used a custom image reduction program (Salaman et al. 1999), which calculates the position angle, angular separation and magnitude difference.

In the case where the composite image does not show two components obviously separated, it is treated by the wavelet method (Wavelet function of the QMIPS32 program), which analyses the spatial frequencies of the image. The selective extraction of the higher frequencies allows separation of the components.

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**Table 2.** Comparison, for the orbital binaries, between our observations (O) and values calculated (C) from the Fifth Catalog of Orbits of USNO, update 20 Nov. 2000

| CCDM identifier | NAME of the pair | DATE of observations | Our observations (O) | | Calculated values (C) | | Grade | Reference | Differences O - C | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | θ ° | ρ " | θ ° | ρ " | | | θ ° | ρ " |
| 12244+2534 | STF 1639 AB | 2000.370 | 325.2 | 1.75 | 324.6 | 1.72 | 4 | Ole 2000b | 0.6 | 0.03 |
| 13325+2914 | HO 260 AB | 2000.373 | 81.9 | 1.47 | 83.3 | 1.31 | 4 | AmC 1978 | - 1.4 | 0.16 |
| 13375+3617 | STF 1768 AB | 2000.373 | 99.2 | 1.79 | 99.1 | 1.77 | 3 | Sod 1999 | 0.1 | 0.02 |
| 13491+2659 | STF 1785 AB | 2000.353 | 172.9 | 3.38 | 173.4 | 3.32 | 2 | Hei 1988d | - 0.5 | 0.06 |
| 15183+2650 | STF 1932 AB | 2000.353 | 259.6 | 1.63 | 259.7 | 1.60 | 2 | Hei 1965c | - 0.1 | 0.03 |
| 15233+3018 | STF 1937 AB | 2000.367 | 62.5 | 0.74 | 66.3 | 0.70 | 1 | Msn 1999a | - 3.8 | 0.04 |
| 15245+3722 | STF 1938 BC | 2000.367 | 8.5 | 2.26 | 8.6 | 2.24 | 2 | Sod 1999 | - 0.1 | 0.02 |
| 16439+4329 | D 15 AB | 2000.339 | 107.5 | 0.55 | 113.2 | 0.58 | 2 | Hei 1998 | - 5.7 | - 0.03 |
| 16518+2840 | STF 2107 AB | 2000.339 | 97.5 | 1.45 | 98.8 | 1.35 | 3 | Sca 1984a | - 1.3 | 0.10 |
| 18358+1658 | STT 358 AB | 2000.370 | 155.2 | 1.71 | 154.3 | 1.59 | 4 | Hei 1995 | 0.9 | 0.12 |

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* The catalogues are available from the CDS at Strasbourg.

** Currently updated by the authors at the Royal Observatory of Belgium.

*** `http://sidonie.obs-nice.fr/`