



CATALOGS

Understanding the Rectilinear Catalog





Rectilinear Catalog

BRIEF Overview

Many systems in the Washington Double Star Catalog have shown significant relative motion since their discovery.

The *Catalog of Rectilinear Elements* provides linear fits for those systems whose motion does not appear to be Keplerian.

While a few of these may in fact be very long-period physical pairs whose orbital motion is not yet apparent, most are probably optical pairs (i.e., chance alignments of unrelated stars). These linear fits, then, just describe the relative proper motions between these pairs of stars.


The purposes of this catalog are threefold:

1. The very well-defined motions of some of these systems means they may prove useful for scale calibration for imaging systems such as CCDs or photographic cameras
2. These differential proper motions may allow us to improve upon proper motions of individual components.
3. Finally, these linear fits, especially in comparison with Hipparcos proper motions, may be useful in searches for submotions due to closer components.



Rectilinear Catalog

Location in the WDS

**Catalog of Rectilinear Elements**
(last updated 6 November 2013)

- Optical/IR Products
 - NOMAD
 - UCAC
 - URAT
 - USNO-B1.0
 - Double Stars
 - WDS
 - ORB6
 - LIN1**
 - INT4
 - DM3
 - WMC
 - DSL
 - Solar System Bodies
 - USNO Image and Catalog Archive Server
 - VLBI-based Products
 - Astrometry Information Center

Introduction & Purpose

Many systems in the Washington Double Star Catalog have shown significant relative motion since their discovery. The *Catalog of Rectilinear Elements* provides linear fits for those systems whose motion does not appear to be Keplerian. While a few of these may in fact be very long-period physical pairs whose orbital motion is not yet apparent, most are probably optical pairs (i.e., chance alignments of unrelated stars). These linear fits, then, just describe the relative proper motions between these pairs of stars.

The purposes of this catalog are threefold. First, the very well-defined motions of some of these systems means they may prove useful for scale calibration for imaging systems such as CCDs or photographic cameras. Also, these differential proper motions may allow us to improve upon proper motions of individual components. Finally, these linear fits, especially in comparison with Hipparcos proper motions, may be useful in searches for submotions due to closer components. These investigations are underway.

Definition of Terms

A very straightforward method was used to define the motion of the secondary star relative to the primary:

Define:

$$x = -\sin(\theta) * \rho$$
$$y = \cos(\theta) * \rho$$

and let (x_0, y_0, t_0) or (ρ_0, θ_0, t_0) define the relative location and time of closest approach

Solve for:

$$x = x_0 + (t - t_0) * x_0$$
$$y = y_0 + (t - t_0) * y_0$$

A standard weighted least squares fit is made, with weights of individual measures determined using the technique outlined in the Sixth Catalog of Orbits of Visual Binary Stars.

Catalog Files

Available files are as follows:

- [main catalog](#)
- [notes](#) to individual systems (linked from main catalog by "N" in righthand columns)
- [ephemerides](#) for 2000-2025 (linked from main catalog by "E" in righthand columns)
- [references](#) to information in the notes file

USNO Master Clock
Time
Thu, 13 Sep 2018
23:00:56 UTC

The Sky This Week
The Sky This Week,
2018 September 11 -
18
[More...](#)

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Rectilinear Catalog

Overview

Catalog of Rectilinear Elements: Elements

Grade, Notes,
Figure,
Ephemeris
References

Discoverer		Magnitudes		Linear Elements													
RA,Dec (2000).....	WDS.....	DD.....	ADS..	HD/BD/CD/CPD....	V1...	PM1.....*	X0.....	XA.....	Y0.....	YA.....	* T0.....	RHO0...	THETA0	N	P	E	Ref.....
.....	.....	.....	BDS..	HIP/TYC/etc.....	V2...	PM2.....	+/-.....	+/-.....	+/-.....	+/-.....	+/-.....	+/-.....	+/-...	.	.	.	.....
000210.18+270455.6	00022+2705	BU 733AC	17175	BD+26 4735	5.83	+830-989	-43.542366	-0.837509	-72.526352	-0.983540	1940.261	84.593	329.02	N	P	E	Hrt2017a
			12701	4UC 586-000099	9.88	-003-007	0.216402	0.002979	0.229821	0.001827	0.224	0.226	0.15				
000210.18+270455.6	00022+2705	BU 733AD	17175	BD+26 4735	5.83	+830-989	-127.280243	-0.859018	-81.664696	-0.973279	1955.078	151.226	302.68	N	P	E	Hrt2017a
			12701	4UC 586-000099	14.2	-034-015	0.442530	0.003497	0.498674	0.003664	0.496	0.460	0.18				
000210.18+270455.6	00022+2705	BU 733AD	17175	HD 224930	5.83	+830-989	-31.112516	-0.859930	27.439632	-0.975034 *	1843.204	41.484	228.59	N	P	E	USN2011a
			12701	HIP 171	14.2	-034-015	1.054806	0.008273	0.922875	0.005234	0.788	0.999	1.36				

J2000 Coordinates &
WDS Designation

Catalog

Proper
Motion

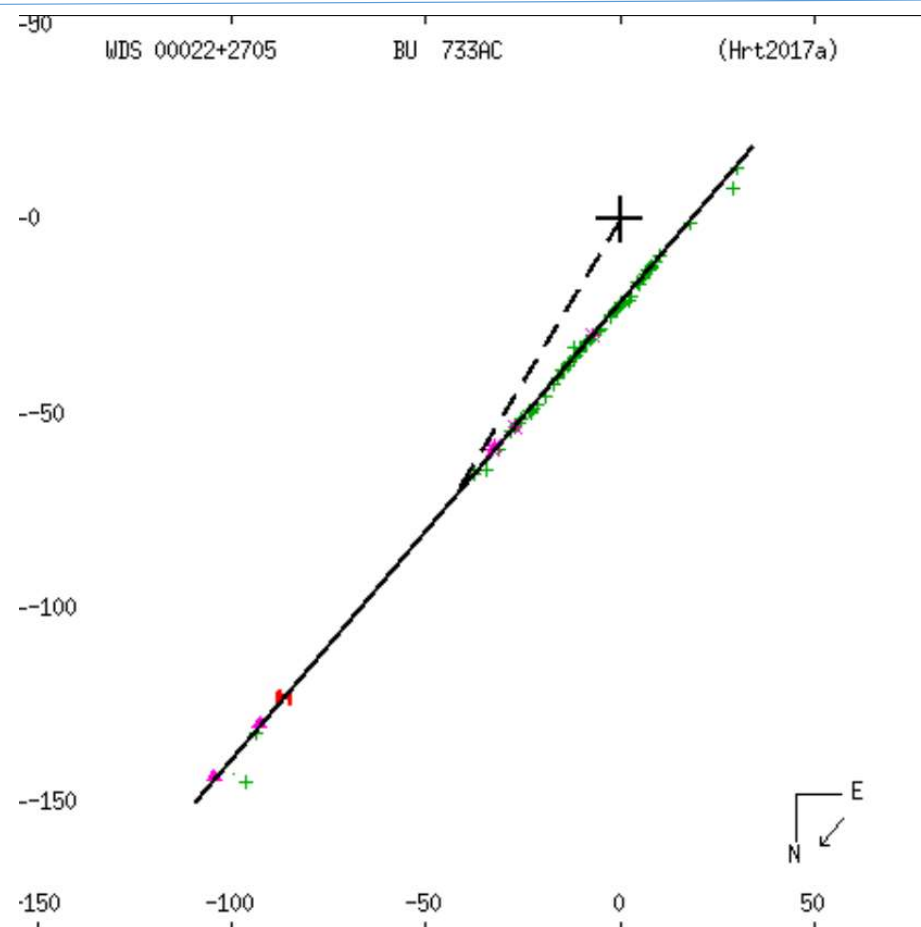
Theta
and Rho



Rectilinear Catalog

Linear Plot

- Figures are also provided for each system
- The figures include all measures in the WDS, as well as the linear fits whose elements are given in the main catalog (shown as a solid black line)
- Individual measures are color-coded as in the Orbit Catalog; green, blue, and purple indicate micrometric, interferometric, and photographic measures, respectively, while a red "H" or "T" indicates a measure from Hipparcos or Tycho.
- For those pairs with two sets of proper motions in the WDS, a red line indicates the differential proper motion predicted by these values.
- The lengths of both the black and red lines correspond to a range of dates (usually roughly corresponding to the range of observation dates, unless T0 falls outside that range).





Rectilinear Catalog

Questions?