
Subject: Re: How to compute SIP distortion parameters?
Posted by [wlandsman](#) on Sun, 11 Sep 2011 02:39:34 GMT
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On Saturday, September 10, 2011 10:18:15 AM UTC-4, MichaelT wrote:

> Now my question: Is there some code available that computes the SIP
> distortion parameters from those data (using a selected order of the
> polynomial)?

1. It would be nice if one could directly use the IDL POLYWARP function, which computes distortion coefficients. But as I wrote in a post about a year ago, the order of a solution in POLYWARP has a different meaning from what one intuitively expects, and different from what is needed for the SIP distortion parameters. In POLYWARP, a first order solution is of the form

$$x_{\text{prime}} = a + b*x + c*y + d*x*y$$

and so is actually nonlinear along the line $x = y$. In the SIP convention, a first order solution is the expected linear solution of the form:

$$x_{\text{prime}} = a + b*x + c*y$$

2. I wrote a program a couple of years ago to use `mpfit2dfun` to find quadratic SIP parameters. I can send this to you, though it is not documented and was written for a specific situation. One thing to note though is that you don't want to first find a linear solution (e.g. with STARAST) and then determine the nonlinear SIP coefficients, but rather you want to find all astrometric parameters at the same time.

3. You might want to also look at the remarkable <http://astrometry.net> Web page. This is a "Google for the sky" package, which is meant to take any image of the sky (or list of star positions), and use pattern matching on large astronomical catalogs to find an astrometric solution. You don't need to give any additional information such as an approximate plate scale or pointing direction. They have the option to include SIP distortion parameters. (Admittedly I never got these to work, but I didn't try very hard and it was a couple of years ago.) --Wayne

Subject: Re: How to compute SIP distortion parameters?
Posted by [MichaelT](#) on Sun, 11 Sep 2011 20:23:47 GMT
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Thanks for your reply Wayne!

> 1. It would be nice if one could directly use the IDL POLYWARP function, which computes distortion coefficients.

I was thinking about using `mpfit`. Then I could choose the function I want to use for fitting.

> 2. I wrote a program a couple of years ago to use mpfit2dfun to find quadratic SIP parameters. I can send this to you, though it is not documented and was written for a specific situation. One thing to note though is that you don't want to first find a linear solution (e.g. with STARAST) and then determine the nonlinear SIP coefficients, but rather you want to find all astrometric parameters at the same time.

OK, thanks for that advice. So the optimal procedure it is not as simple as I had thought. The distortions are small (< 3 pixels) - so maybe I could still do it in two steps? Anyway, it would certainly be great if I could have a look at your code!

>
> 3. You might want to also look at the remarkable <http://astrometry.net> Web page.

I know this page and have used it quite often. It basically inspired me to have a look at all the fits header astrometry stuff. But for an amateur who wants to stack 40+ images, uploading all the images would be a bit inconvenient. So I try to come up with something that is quicker.

Michael
