
Subject: Interpolation to conserve integrated flux
Posted by [jdshaw](#) on Sun, 30 May 2010 01:13:43 GMT
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Hi all,

I am hoping someone out there can help me with this.

I am looking to combine spectra such that the integrated flux between any arbitrary set of points is conserved.

Consider a set of two equal length float arrays, one containing wavelength values (call this $x_1, x_2, x_3, \dots$) and one containing flux values (call these $y_1, y_2, y_3, \dots$). So that y_1 goes with x_1 and y_2 goes with x_2 , and so on.

Unfortunately, the wavelength arrays ($x_1, x_2, x_3, \dots$) have similar values but not the same, e.g.:

```
x1 = [3212.7, 3215.1, 3217.5, 3219.9, ...]  
x2 = [3213.1, 3215.4, 3217.7, 3220.0, ...]
```

What I want to do is combine x_1 and x_2 to x_{comb} and y_1 and y_2 to y_{comb} such that if one were to sum between two wavelengths the in the new arrays (x_{comb} and y_{comb}) you would get the same as doing them in the original (x_1, y_1 and x_2, y_2) and adding the results. That is, if I need to sum up values in y when x is between 3214.0 and 3219.0. For x_1 , I would linearly interpolate the values in y_1 for the two wavelengths and sum under the curve. I then do the same for x_2 and y_2 . I can already do this - that part is simple. What I want to do is have new arrays x_{comb} and y_{comb} such that I can do the same sum across such that the same (summed region in y_1) + (summed region in y_2) = (summed region in y_{comb}).

Is there an algorithm that anyone knows that will do this?

Or, as an intermediate step, is there a way interpolate the values in x_2 to x_1 , and y_2 to an new set of values (y_{2_new}) that keeps the sums of y_2 and y_{2_new} the same between any two arbitrary points (as described above)?

Thanks - John.
