Authorhouse has just published my book, The Noon Fix, and it is available from them or Barnes and Noble. I hope no one is offended by this announcement. My apologies if this comes across as advertising (and I checked with Frank who said it's ok). But you don't have to buy the book to know what it's about. The following is the gist of it:

INTRODUCTION

When I first tried the double altitude method to determine longitude, I quickly found that north-south boat movement affected the time of maximum altitude. I immediately started looking for a simple, direct method of compensating for it. When none was forthcoming, I wrestled with the mathematics to derive the equation for the time between maximum altitude and meridian transit (Reference 1). That was a bit messy, but it worked. But recently, the simple, direct method hit me. Like many others, I slapped my head, muttering, "Why didn't I think of this before?"

THE METHOD

The double altitude approach averages the times for equal altitudes before and after meridian passage. But north-south observer movement and declination change need to be considered, since they affect the measured altitudes. From reference 1, (Sn - d) is the rate of movement between the observer and the body, where Sn is the northerly component of speed, and d is the rate of change of declination, here positive if the change is northerly. Multiplying this by the time between observations gives the resultant change in altitude.

At meridian transit the navigational triangle has become a line. At this time, the change in sextant altitude (Δhs) is (Sn - d)ΔWT, where ΔWT is the difference in watch times between observations. It can be simply added to or subtracted from the initially measured altitude hs. Averaging the times of the initial hs and the adjusted second hs gives the time of meridian transit. That's it!

Relying on single observations is not recommended, but it does illustrate the basic approach. Reference 1 describes a graphical method for determining the time of maximum altitude. There the rising and setting altitudes are plotted versus watch time. Adjusting the setting line determines the time of LAN at their intersection.

DISCUSSION

The intent of this method was to simplify the approach. But three unexpected bonuses resulted. The first is that the method is insensitive to the body selected. The same approach can be used to get the time of meridian transit for all bodies, including the moon. The second is that the asymmetry of the altitude-time curve due to north-south motion is automatically considered. The third is that changes in longitude are also automatically considered. These benefits accrue because the method utilizes the data contained in the slope of the altitude lines. Consider an observer with a westward component of movement. His measured altitudes will rise and fall at a lesser rate than an observer traveling along a meridian. Thus the hs versus WT lines will have a flatter slope. This means that there will be a greater WT difference between equal altitudes. Thus the resultant change in hs will be greater, and the time difference between maximum altitude and meridian transit will also be greater.

CONCLUSION

While the method was aimed at getting the simplest backup to GPS, other uses may materialize. That it's more accurate than the equation in reference 1 (and its predecessor in the Admiralty Navigation Manual some fifty plus years earlier) could be of benefit.