The Method of the Latitude at Sea, by taking two Altitudes, either in the Forenoon or Afternoon having the intermediate time measured by common Watch, with Ease and Accuracy, independent of the Sun's Meridian Altitude.

The New Practical Navigator, 10th Edition by John Hamilton Moore (p. 206)
https://books.google.com/books/about/The_New_Practical_Navigator.html?id=l1sUAAAAQAAJ

Suppose the Sun's altitude is observed to be h_1 at hour angle H_1 and h_2 at H_2. Then the usual cosine formula gives

$$\sin h_1 = \sin L \sin \delta + \cos L \cos \delta \cos H_1$$
$$\sin h_2 = \sin L \sin \delta + \cos L \cos \delta \cos H_2$$

where L is the latitude by account and δ is the declination of the Sun. Subtracting the two gives

$$\left(\sin h_2 - \sin h_1\right) \sec L \sec \delta = \cos H_2 - \cos H_1 = 2 \sin\left(\frac{H_2 + H_1}{2}\right) \sin\left(\frac{H_1 - H_2}{2}\right)$$

and hence

$$2 \sin\left(\frac{H_2 + H_1}{2}\right) = \frac{\left(\sin h_2 - \sin h_1\right) \sec L \sec \delta}{\sin\left(\frac{H_1 - H_2}{2}\right)}$$

This allows the hour angle at the midpoint of the elapsed interval to be determined. From it and half the elapsed interval the hour angle at which the second sight was made is found from

$$H_2 = \left(\frac{H_2 + H_1}{2}\right) - \left(\frac{H_1 - H_2}{2}\right)$$

If h_0 is the Sun's meridian altitude then

$$\sin h_0 = \sin L \sin \delta + \cos L \cos \delta$$

and subtracting

$$\sin h_2 = \sin L \sin \delta + \cos L \cos \delta \cos H_2$$

which yields

$$\sin h_0 = \sin h_2 + \cos L \cos \delta \left(1 - \cos H_2\right)$$

The meridian altitude is used in the reduction of a noon sight in the usual way.