

Recognize a Star by Altitude and Azimuth

INPUT: Altitude (Alt), North Azimuth(Az), UT, Latitude(Lat), Longitude(**Long**)

OUTPUT: Declination (**Dec**) and Right Ascention(**RA**) of The Star

Additional Output: Local Hour Angle(**LHA**), Sidereal Hour Angle (**SHA**),
Greenwich Hour Angle (**GHA**) of The Star

Main Equations are:

$$\sin(\text{Dec}) = \sin(\text{Lat}) \cdot \sin(\text{Alt}) + \cos(\text{Lat}) \cdot \cos(\text{Alt}) \cdot \cos(\text{Az})$$

$$\cos(T) = \frac{\sin(\text{Alt}) - \sin(\text{Lat}) \cdot \sin(\text{Dec})}{\cos(\text{Lat}) \cdot \cos(\text{Dec})}$$

if Az < 180 then LHA = 360 – T

if Az > 180 then LHA = T

UT → GMST

LHA = GMST + Long - RA

GHA = GMST – RA

GHA = LHA - Long

SHA = 360 - RA