

```

/*
FILE: Hc Zn.cs

B - Latitude +N/-S
L - Longitude +E/-W
Dec - Declination +N/-S
GHA - Greenwich hour angle

LHA - Local hour angle

Hc - Altitude (calculated)
Zn - Azimuth

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Navigational Algorithms
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*/

namespace NavigationalAlgorithms
{
    public class HcZn : Sexagesimal
    {
        public static double LHA( double L, double GHA )
        {
            return( ang_0_360( GHA+L ) );
        }

        public static double Hc( double B, double Dec, double LHA )
        {
            return( ASIN( SIN( B )*SIN( Dec )+COS( B )*COS( Dec )*COS( LHA ) ) );
        }

        public static double Zn( double B, double Dec, double HC, double LHA )
        {
            //Z = ACOS( (SIN( Dec )-SIN( B )*SIN( HC ))/(COS( B )*COS( HC )) );
            double Z;

            // |cos(x)| <= 1
            double x = ( (SIN( Dec )-SIN( B )*SIN( HC ))/(COS( B )*COS( HC )) );
            if( x > +1.0 ) x = +1.0;
            else if( x < -1.0 ) x = -1.0;

            Z = ACOS( x );
            if( LHA <= 180.0 ) Z = 360.0-Z;

            return( Z );
        }
    }
}

```