```
Double3 TransformSystemG::WGS84CoordinateTransformRadian_To3D(double longitude, double latitude, double altitude)
  {
    constexpr double a = 6378137.0; // unit meter
    constexpr double b = 6356752.314245; // unit meter
    constexpr double a2 = a * a;
    constexpr double b2 = b * b;
    constexpr double e2 = (a2 - b2) / a2;
    double v = a / sqrt(1 - e2 * sin(latitude) * sin(latitude));

    double x = (v + altitude) * cos(latitude) * sin(longitude);
    double y = ((1 - e2) * v + altitude) * sin(latitude);
    // reverse the z component to translate the 3D coordinate from right-handed to left-handed
    double z = -(v + altitude) * cos(latitude) * cos(longitude);

    return Double3(x, y, z);
  }
```