The maximally regular net on the sphere

V. Pohánka
Geophysical Institute of the Slovak Academy of Sciences[1]

Abstract: The maximally regular division of the spherical surface into a set of domains is constructed starting from the triangular domains which are central projections of the sides of the regular icosahedron; any triangular domain is then divided into four smaller triangular domains by joining the centres of edges of the original domain by segments of great circles. The vertices of these domains represent the maximally regular net of points on the sphere. The geometrical properties of the triangular domains are investigated and it is shown that for any triangular domain, the mutual ratios of the lengths of its edges are bounded within a narrow interval. A unique and simple coding of domains and their vertices is introduced: the code of each domain and each vertex is a sequence of digits. The formulae for transformation of the code of any vertex to its Cartesian coordinates and vice versa are introduced; the neighbourhood of a point (as a set of triangular domains) is defined and the formulae allowing to find the code of any neighbouring domain from the code of the given domain (and similarly for the neighbouring vertices of the given vertex) are presented. The described construction of the net can be easily adapted to the surface of the rotational ellipsoid.

Key words: regular icosahedron, spherical triangle, domain, edge, vertex

[1] Dúbravská cesta 9, 845 28 Bratislava, Slovak Republic
e-mail: Vladimir.Pohanka@savba.sk