ANALYZING THE DIRECTIONAL RELATIONSHIPS BETWEEN TWO OBJECTS WITH COMPLEX SHAPES BY GEO-INFO GRAPH SPECTRUM

M. Duan[*a] Z. Liu[b] Y. Sun [b]

[a] Chinese Academy of Surveying and Mapping, Institute for Photogrammetry and
Remote Sensing, No.28 Lianhuachixi Road, Haidian District, 100830, Beijing, China
[b] Chinese Academy of Surveying and Mapping, Institute for Photogrammetry and
Remote Sensing, No.28 Lianhuachixi Road, Haidian District, 100830, Beijing, China

Technical Commission VII Symposium 2010

KEY WORDS: directional relationships, geo-info graph spectrum, directional spectrum analysis, spectrum generation, geographic entity

ABSTRACT:

Research on theories about directional relationships between geographic entities is one of the hot topics in the field of GIS, and directional relationship is one of the fundamental spatial problems to be encountered and solved when the geographic world is expressed and represented. Moreover, the directional relationships have very wide applications. However, the directional relationships between geographic entities are very complex, and sometimes they are relative. A rigorous mathematical method, namely directional spectrum analysis, is proposed to represent the directional relationships based on the concepts of Geo-info Graph Spectrum. As a result, the complicatedness of directional relationships can be represented by their spectrums or feature values, and the relativity of directional relationships can be represented by the hierarchies of their spectrums or feature values. An experiment is given to illustrate the feasibility and advantages of our proposed approach, and it introduces how to use Directional Spectrum Analysis to do spectrum generation and spectrum analysis to obtain directional relationships between geographic entities. The results demonstrate that directional relationships of any two non-included complex objects in GIS can be expressed by graph spectrum.