The matrix representation of rotation with the use of quaternions

Amanda Mariia da SILVA & Daniel Carneiro da SILVA, Brazil

Key words: Photogrammetry; Quaternions

SUMMARY
The orientations (usually given as rotations about the original source as Biasi and Gattass (2002)) are important in various fields of knowledge as Geodesy and Photogrammetry. There are several ways of representing these rotations, for example, Euler angles, the array based on the angles of rotation T, if the matrix Rodriguez, besides the field of photogrammetry quatérnios. In the generally used is the Euler angles but some problems occur with the use of this procedure. Therefore, since the representation of rotations of great relevance to some areas of knowledge, interest permeates the research question: How to solve the problem of orientation brought about by the use of Euler angles (Gimbal lock) in terrestrial photogrammetry from the standpoint theory? According to Gall and Tozzi (2001, apud, Shih, 1990) the only representation that has no critical condition and does not have the problem of dual solutions is based on quaternions. The choice to work with quaternions in terrestrial photogrammetry lies in the fact that these orientations translate themselves, often in ill-conditioned systems when applied to Euler angles. The very fact of opting for terrestrial photogrammetry is due to data being obtained at a lower cost than with aerial photogrammetry. This article aims to identify theoretical solution to the Gimbal lock occurs in terrestrial photogrammetry orientation with quaternions. For this purpose it is necessary to make the study of topics such as Photogrammetry and Quatérnios.O work aims to bring contributions for professionals and Mapping Sciences Geodésicas.Como specific objectives the research aims to: Identify the Gimbal lock; Using quaternions to solve the Gimbal lock. The methodological approach chosen for the development of this study is divided on the basis of the activities are: Study of the instability in the solution of systems of equations; Test the problem of instability that occurs in spatial orientation when using the Euler angles; Highlight the Gimbal lock ; Troubleshoot unstable (relative to terrestrial photogrammetry) by quaternions. Expected to achieve the general goals and specific and have more applicability of quaternions in terrestrial photogrammetry. This factor leads to the conclusion that the importance of using quarténios to solve some problems related to engineering mapping.

TS09D – Posters – 6359   1/1
Amanda Mariia da SILVA & Daniel Carneiro da SILVA
The matrix representation of rotation with the use of quaternions

8th FIG Regional Conference 2012
Surveying towards Sustainable Development
Montevideo, Uruguay, 26 – 29 November 2012