AUTOMATION OF DEFORMATION DATA

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ABSTRACT

Deformation can be detected through periodical observation. Some cases, the period of taking the observation is short as hours or even minutes in other cases could be weeks or months. The series of observations can be recorded automatically and feed to a mathematical model in computer and so the analysis shows the required results as fast as it is needed. An example of these automation for deformation data is given in two cases of deformation.

Keywords: Automation, Deformation, Recorded, Mathematical, Chart.

INTRODUCTION

Deformation can be detected through periodical observations. The period between two successive observation could be small as one minute or long as one year. Deformation is expressed as the change of coordinates on points with time. Therefore the coordinates of a points is determined as x,y,z,t, where is the three dimension coordinates is a company with time.

From an each X_o, Y_o,Z_o,T_o of a point, the coordinates x,y,z,t after interval of time $(t-t_o)$ express the movement of this points as magnitude and direction. According to the movement expected, the accuracy of measuring the coordinates is determined, also the period between two successive observations and fasting the desussion of speeds or slowing the monitoring.

Accordingly by automation of data of deformation, fast processing of these data and clear representation is needed. Two examples of slow monitoring as satelment of building and inclination of minarets and fast monitoring of earthquake are given.

2- AUTOMATION OF DATA

In order to receive the data automatically from surveying instrument to computer, electronic instruments such as total station and electronic level are used. The connection between the surveying instruments and computer is directly by cable or moderm. The cable is used when $(t-t_o)$ is small and the computer is in the field. If $(t-t_o)$ is large then the moderm is used.

3- COMPUTER PROGRAM OF AUTOMATION

A software program is designed to control the period of monitoring and the frequency of data. The software is designed as the following flowchart. Following the chart in Figure (1) a computer software was written and linked to graphical program Auto cad 12. The part of mathematical computations is changed according to the case of deformation which this program was used. The following are two cases of deformation which this program was used.

The first is for observing satelment of an electric power station and the second for observing a minaret. In the first case the earthquake hit the observations and cause rising of the building of the electric power station, one day before then after the earthquake the building return to its position (Bolbol & Hamed 1994).

4- AUTO MONITORING OF ELECTRIC POWER STATION

For monitoring an electric power station in Cairo, the following preparations were done:

(a) Building nine pillars (1.5m under ground and

1.5m over ground). Five pillars around the building and four on the basement. The pillars were covered with fixed iron plate in order to set a total station or electronic level.

(b) on the building, 107 points for levelling and 77 sticker reflector were fixed on the outside walls and inside the basement.

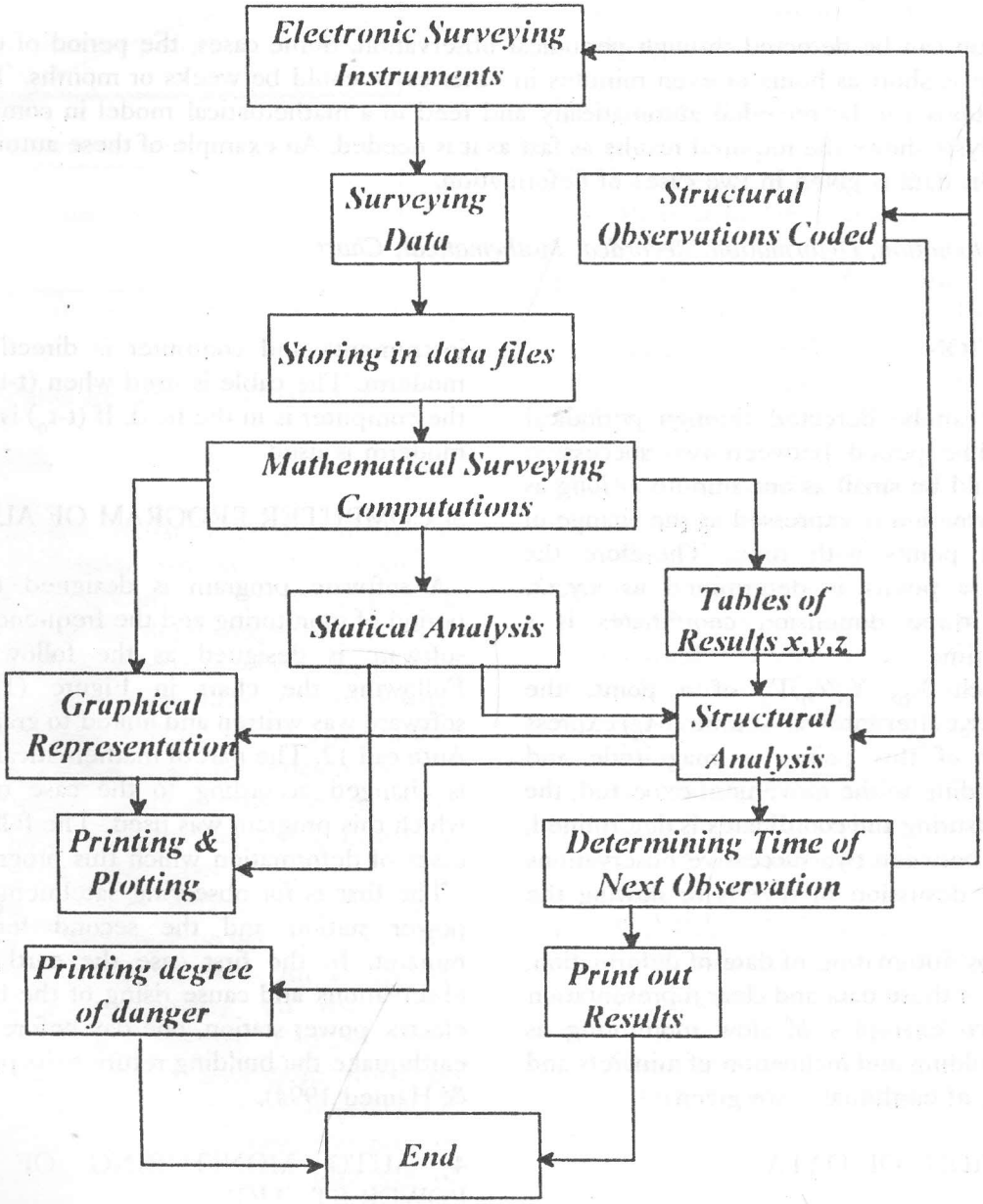

Figure (1)

4-1 Observations

A series of observations were taken during 21 weeks as 21 sets of observation of levelling and coordinates using level and total station respectively. The observation were reffered to fixed points outside the building on the sides of the pillars.

4-2 Connection between total station and computer was made to receive the observation directly. The software of computer was to calculate the coordinates every observation. The structural control was giving the time of second observations. The event of rising the building before the earthquake and satelment after was recorded.

5- AUTO MONITORING OF MINARETS INCLINATION

Periodical observations to determine the inclination of minarets were taken accompany with structural analysis. The software computer program was done as a part of geographical information system of those minarets. The data were taken as input into the computer. A mathematical analysis and graphical representation were made every time of taking the observations either surveying or structural. Therefore expectation of degree of safety of minarets were made.

6- CONCLUSION

(a) Fast recording and analysis of following the deformation is necessary in many cases in order to follow the events such as earthquake and fast movements.

(b) The periodical observations of deformation of parts of an object such as minarets can be linked results and analysis to GIS program. Then a full analysis between similar objects such as minarets can be done.

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