

# APG4005F Assignment 3 - Free Network Adjustment

Jason David Russell - RSSJAS005

07/05/2015

# Contents

<b>1</b>	<b>Introduction</b>	<b>2</b>
<b>2</b>	<b>Background</b>	<b>2</b>
2.1	Classification of Deformation Analysis . . . . .	2
2.2	Network Classifications . . . . .	2
<b>3</b>	<b>Problem Statement</b>	<b>3</b>
<b>4</b>	<b>Method</b>	<b>3</b>
<b>5</b>	<b>Results</b>	<b>3</b>
<b>6</b>	<b>Discussion</b>	<b>3</b>
<b>7</b>	<b>Conclusion</b>	<b>3</b>

# 1 Introduction

The aim of this assignment is to conduct an Epoch deformation analysis using fictitious data with a Free Network least squares adjustment.

## 2 Background

### 2.1 Classification of Deformation Analysis

There are three main classifications of deformation analysis monitoring methods, Permanent, Semi-permanent and Epoch. There are advantages and disadvantages of all three methods. The main advantages of the Permanent and Semi-permanent methods are that they are continuous and offer a very high precision. These two methods make use of a multitude of sensors, such as capacitive, strain, inductance and electro-optical sensors. These sensors are able to produce data in realtime which is useful for situations in which immediate data is required in order to, for example, raise an alarm. Some of the disadvantages of these two methods of deformation analysis is that the sensors are expensive, and require regular calibration. Epoch monitoring involves geodetic and/or photogrammetric techniques to capture data, this is beneficial in that relative and/or absolute positions of many points can be obtained, as opposed to just relative positions in the case of the Permanent and Semi-permanent methods mentioned above. Another advantage of Epoch monitoring is that it is much more cost effective.

### 2.2 Network Classifications

Typically, when constructing a network for Epoch deformation analysis, a free or minimum constrained network is used, preferably free. In a free network adjustment, no parameter is held fixed, and as a result, precision estimates for all points are provided in the variance-covariance matrices. The effect of holding no parameters fixed is that the shape of the network is defined only by the observations. One of the main advantages of not holding any parameters fixed is that the shape of the network is not affected by errors in the coordinates of the points defining the datum (because the network is not tied to the datum and is allowed to 'float')

- 3 Problem Statement
- 4 Method
- 5 Results
- 6 Discussion
- 7 Conclusion