Using Semiparametric Model to Determinate Parameters of Crustal Movement

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1 INTRODUCTION

With the development of the space geodetic technology, more and more data which are with high precision and high spatial and temporal resolution can be used to study the crustal movement, and these technologies provide much more convenience than the traditional geodetic network. So the quantitative analysis of crustal deformation using different space technologies has become a "hot spot" in earth science. At present, many researches take the plate as rigidity and use least squares method(LSM) to determinate the parameters of horizontal crustal movement relative to the ITRFyy based on the Euler equation[1][2]. They assume that the plate is rigid and the crustal movement contributes most to the velocity at the site, so they divide the local deformation into observation noise [2]. Obviously, this hypothesis isn't strict, because in some areas, local deformation can't be neglected and the sites in these areas may suffer the effect of local deformation. As a result, it is necessary to revise the model.

Semiparametric model is a statistic model proposed in the Eighties of last century. It not only has linear components which describe the function relation of known observations, but also has non-linear components which describe the error of the model. It has so much expositive ability that it can generalize and describe many problems in practice. In the recent years, it has been applied in many areas, such as separating the delay of the ionosphere and troposphere from the multi-errors[3] in the GPS, deformation analysis [4] etc. These researchers all get better results than the LSM.

In this paper, we will use the semiparametric model to determinate the parameters of the horizontal crustal movements based on the front researches. And the data we used are relative to the ITRF2005 which is the newest released by the IERS.

2 MATHMATIC MODEL OF THE CRUSTAL MOVEMENTE

3 SEMIPARAMETRIC MODEL BASED ON THE COMPENSATION LEAST SQUARES PRINCIPLE

4 COMPUTATION AND ANALYSIS

5 CONCLUSION

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