

DGFI Analysis Center

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Abstract

At DGFI both the CALC/SOLVE software (installed at GIUB and accessible via inter net) and the OCCAM package are used for VLBI data analysis, and a thorough knowledge of both software packages exists. The main activities of the DGFI VLBI group during the last year were focussed on the following tasks: artificial intelligence methods, OCCAM modifications, and comparison of CALC/SOLVE and OCCAM

1. Application of Artificial Intelligence (AI) Methods

An important contribution to accelerate the VLBI procedure is a faster and semi-automatic data analysis, which is in particular needed in view of the increasing amount of VLBI data to be processed in the next years. Most of the tasks in the VLBI data analysis are very complex and their automation requires typical knowledge-based techniques, but some tasks can be automated by conventionally programmed algorithms within the existing software. First, a concept for the automation of the Mark III Data Analysis System was developed.

Then, the program PWXCB, which extracts weather and cable calibration data from the log files, was automated by extending the existing Fortran77 program code. The new program is called XLOG. In XLOG the calibration data are extracted from the log files and are checked with respect to their plausibility, then wrong data are deleted. These tasks are done automatically, but in case of probably wrong data the analyst's attention is directed to these suspicious data. At present a beta version of XLOG is being tested to be used for routine application. It is planned to release version 1.0 of XLOG in Spring 1999.

Now, an intelligent assistant for support and guidance of the analyst is being developed using the workbench BABYLON, which is based on methods of artificial intelligence. The construction of the new system to automate the tasks done by the program SOLVE has been started, because these tasks are very complex and require a comprehensive knowledge of the whole procedure of data analysis. The system can also be used as a teaching-system for less experienced analysts. This would be very helpful because there is a shortage of qualified experts and the analyst's training takes a long time.

2. Modification of OCCAM

The OCCAM V3.4 package installed at DGFI was extended by allowing a-priori correlations between the VLBI observables, i.e. including a full variance-covariance matrix. Empirical correlation coefficients had been computed already at the beginning of the 1990s [1], but they were neglected so far due to missing computer capacity and power. Now, the a-priori correlation matrix was constructed with the formerly obtained empirical correlations. They were compared with the a-posteriori correlations between the observables which were taken from a first least squares adjustment. This allows to optimize the determination of realistic a-priori correlations which are in fact rather high. Their consideration in the VLBI least squares fit will improve the results in par-

ticular with respect to more realistic formal errors than those obtained by the present uncorrelated approach. It is planned to do further work on that and on the models used in OCCAM.

3. Comparison of Software Packages (CALC/SOLVE and OCCAM)

At DGFI both the CALC/SOLVE software and the OCCAM package are used for VLBI data analysis. First comparisons of the results have been done. They yield a rather good agreement of the pattern of residuals. However, the geodetic results (baseline components, Earth orientation parameters, ...) still show significant differences probably due to different models used in both software packages and due to the procedures applied for editing the data and choosing the a-priori weights of the observables. The comparisons will be continued in more detail. It is planned to use databases of the IRIS-S sessions for that.

References

- [1] Schuh, H. and A. Wilkin: Determination of Correlation Coefficients between VLBI Observables. Proc. 7th Meeting on European VLBI, Madrid 1989, ed. by A. Rius, CSIC/Univ. Complutense de Madrid, pp. 79-91, 1990.