ABSTRACTS OF CONTRIBUTED PAPERS

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LIST OF PAPERS

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The program calculates the Riemann, Ricci, Einstein and Weyl tensors (both tetrad- and coordinate-components) from a given orthonormal tetrad representation of the metric. Its essential features were described in the proceedings of the GR9 and GR10 conferences, and references cited therein, see also Refs 1 and 2. This note mentions only the improvements made after GR10.

1. Versions available. No new computer implementations were made after GR10. Of the 4 versions mentioned there, only the U.T. LISP 4.1 version for CDC computers was further developed.

2. Auxiliary programs for inverting matrices, simple algebraic operations and calculating the Lie derivative of the Riemann tensor work now as appendices to the main program and tailor its code appropriately without bothering the user. Previously, each of the programs was a large file comparable in size to the main program. At present, their size is 5 to 10 times smaller. They will work now only with the CDC-version of the main program because the other versions did not evolve since 1983 and became incompatible with the newest CDC-version.

3. More powerful substitution procedures are now available. It is no longer necessary to specify literally the sub-expression which is to be found and substituted for. The user can define a special class of variables called MARKERS; let e. g. A and B be MARKERS. Then A and A_2B can represent just anything, (log A) meaning "the logarithm of anything", A^2 meaning "the square of anything", A^B meaning "any exponent of anything". Thus the command E^A = 0 will mean "replace any power of E by zero" and result in retaining only terms linear in E in the formulae. If $r^2 = x^2 + y^2 + z^2$, then the single command $R_{,A}$ = A/R will cause that the 3 substitutions $r_{,x}$ = x/r, $r_{,y}$ = y/r and $r_{,z}$ = z/r will be automatically performed. Substitutions of this type are known in algebraic programming as pattern matching. Their introduction did not make the format of the program-data more complex, on the contrary, some commands were actually simplified. A more powerful algorithm to handle exponentiation of rational numbers was also introduced.

4. Updated documentation is now available in the form of a recording on a magnetic tape and arrives always together with the programs themselves. The most recent update was made in December 1985.

5. Availability. Three versions of ORTOCARTAN (those for the IBM-like and for CDC computers) are now recorded on a single magnetic tape, together with the auxiliary programs, several examples for testing each program and an up-to-date set of documentation (user's manual + detailed description of the code). The tape is both CDC- and IBM-readable. Copies of ORTOCARTAN were installed at several institutions in Europe, but it is impossible to know where it is in active use. Only this author can guarantee to supply the most recent version.

References:
1. A. Krasiński, SIGSAM Bulletin 17, 12 (1983).
2. A. Krasiński, in: N. N. Govorun (Editor), Proceedings of the Conference on Analytic Calculations on Computers, Dubna 1985 (in press).