The development of poisson series processor on IBM-PC and its applications

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In celestial mechanics, the analytical solutions of the perturbed motion equations for planets, natural satellites and small bodies can be generally expressed in the form of the Poisson series:

$$\sum_{i_1 \ldots i_n} \sum_{j_1 \ldots j_n} C P_1^{i_1} P_2^{i_2} \ldots P_n^{i_n} \frac{cos}{sin}(j_1 M_1 + j_2 M_2 + \ldots + j_n M_n)$$

where $i_1, \ldots i_n; j_1, \ldots j_n$ are integers, C is numerical coefficient, P's are polynomial variables, M's are angular variables. For algebraic and symbolic manipulation of Poisson series, several general purpose processors have been programmed. Among them, Broucke's package written in FORTRAN language and coded on CYBER 170/750 computer has been well adapted. For the convenience of its practical applications, we have implanted Broucke's package on IBM-PC with the software improvments, including changing and rewriting some subroutines, especially those related to output which are machine-dependent. Using this new coding, the analytical perrturbative expressions of near earth satellites due to non-spherical part of the earth gravity field as well as Hansen type and Hill type general perturbations of the asteroids of Flora and Hungaria groupes due to Jupiter have been printed out.

References:

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