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AD Number: ADA154571

Subject Categories: GUIDED MISSILE TRAJ, ACCURACY AND BALLISTICS

Corporate Author: NAVAL SURFACE WEAPONS CENTER DAHLGREN VA

Title: Approximate Planetary Ephemerides for SLBM (**Submarine** Launched Ballistic Missile) Applications.

Descriptive Note: Final rept.,

Personal Authors: Boutchyard,P. ;Harkins,M. D. ;

Report Date: MAY 1983

Pages: 105 PAGES

Report Number: NSWC/TR-83-43

Descriptors: *EPHEMERIDES, COMPUTER PROGRAMS, GUIDED MISSILES, ORBITS, GUIDED MISSILE TRAJECTORIES, MODELS, PARAMETERS, NUMERICAL ANALYSIS, ESTIMATES, RESIDUALS, ERRORS, LEAST SQUARES METHOD, PRECISION, SURFACE TO SURFACE MISSILES, **SUBMARINE** LAUNCHED, CORRECTIONS, PLANETS.

Identifiers: SLBM(**Submarine** launched ballistic missile), Planet computer program

Abstract: This report describes a procedure for estimating planetary orbital parameters which are used to generate approximate planetary positions based on a simple ephemeris model. The computer program developed to implement this procedure are also documented, and an analysis of the residual errors arising from the approximation model is provided. The method described is based on the classical method of Least Squares Differential Corrections which applies to stable nonlinear estimation problems. The actual estimation process was carried out in terms of equinoctial elements to avoid any possible numerical problems and the observations employed were obtained from the precise ephemeris model, DE-92, developed by NASA's Jet Propulsion Laboratory. Originator-supplied keywords: Least squares, Planet, Extract, Lestsq, Geoeq, Delalp, Select, Plot, Delapm.

Limitation Code: APPROVED FOR PUBLIC RELEASE

Source Code: 411567

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