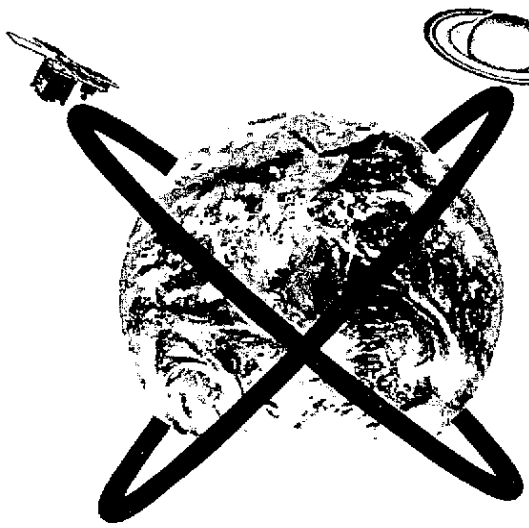
X COLÓQUIO BRASILEIRO DE DINÂMICA ORBITAL



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RESUMOS DOS TRABALHOS

Ressonâncias no Sistema Solar*Observação de Planetas, Satélites Naturais e Asteróides*Atmosferas Planetárias*Missões Espaciais Brasileiras*Astronomia Dinâmica*Dinâmica, Atitude e Controle de Satélites Artificiais*Astronomia Fundamental

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COMPARISON BETWEEN TWO METHODS FOR CALCULATING THE TRANSITION MATRIX OF ELLIPTICAL ORBITS

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The evaluation of the state transition matrix presents one of the highest computational costs on the artificial satellite orbit determination because it requires the evaluation of the Jacobian matrix (partial derivatives) and the integration of the current variational equations. This matrix can pose cumbersome analytical expressions when using a complex force model.

One method to avoid the problem of the high computational cost and extended analytical expressions of the transition matrix on the orbit determination of artificial satellite consists of propagating the state vector using the complete force model and, then, to compute the transition matrix using a simplified force model. The analytical calculation of the transition matrix of the Keplerian motion is a reasonable approximation when only short time intervals of the observations and reference instant are involved. On the other hand, the inclusion of J_2 in the transition matrix can be done adopting the Markely's method.

In this work, the two methods were implemented and analyzed accounting for the computational cost and the accuracy of the estimated state vector. Both methods provide the same accuracy on the orbit determination, however, the Markley's method uses simpler expressions. In general, the Markley's method should be preferably used on the orbit determination problem.