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182079, 7 pageshttp://[dx.doi.org/10.1155/2013/182079](http://www.google.com/url?q=http%3A%2F%2Fdx.doi.org%2F10.1155%2F2013%2F182079&sa=D&sntz=1&usg=AFQjCNFhv55iv7re_w8RN4Aw3dSjqPPRoA)  
  
Research Article  
  
Dynamics of Artificial Satellites around Europa  
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Antônio Fernando Bertachini de Almeida Prado2  
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access article distributed under the Creative Commons Attribution  
License, which permits unrestricted use, distribution, and  
reproduction in any medium, provided the original work is properly  
cited.  
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an Oblate Earth  
[http://www.researchgate.net/publication/245433512\_Nonlinear\_Dynamic\_Equations\_of\_Satellite\_Relative\_Motion\_Around\_an\_Oblate\_Earth](http://www.google.com/url?q=http%3A%2F%2Fwww.researchgate.net%2Fpublication%2F245433512_Nonlinear_Dynamic_Equations_of_Satellite_Relative_Motion_Around_an_Oblate_Earth&sa=D&sntz=1&usg=AFQjCNHUlUoXcGT55BqBXfeCt7kVmPJpFQ)  
  
                "Studying the optimal rendezvous problem, Park et al. (2006) derived  
nonlinear dynamics of relative motion in series form with respect to a  
circular reference orbit. Since the Earth's oblateness causes one of  
the most dominant perturbations in orbital environments, some studies  
have tried to include its effect using the second zonal harmonic (J 2  
) of the gravitational field (Kechichian, 1998; Schweighart and  
Sedwick, 2002; Humi and Carter, 2008; Xu and Wang, 2008). "  
Article: Spacecraft fuel-optimal and balancing maneuvers for a class  
of formation reconfiguration problems  
Sung-Moon Yoo · Sangjin Lee · Chandeok Park · Sang-Young Park  
[Show abstract]  
Advances in Space Research 10/2013; 52(8):1476-1488.  
DOI:10.1016/j.asr.2013.07.019 · 1.35 Impact Factor  
  
  
50.3. Optimizing the Satellite Control Gains with Nonlinear Motion  
Equations using SQP Method  
  
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International Journal of Computer Applications (0975 – 8887) Volume  
118 – No.22, May 2015  
  
Sayed Mohammad Hadi Taherzadeh M.Sc. student  
Space research institute Tehran, Iran  
  
Mohammad Fatehi M.Sc. student Space research institute  
Tehran, Iran  
  
Mehran Nosratollahi, Amirhossein Adami  
Assistant professor Space research institute Tehran  
  
50.4.  
Survey of State-Dependent Riccati Equation in Nonlinear Optimal  
Feedback Control Synthesis  
  
  
60.5. A Block Procedure with Linear Multi-Step Methods Using Legendre  
Polynomials for Solving ODEs  
  
[http://www.scirp.org/journal/PaperInformation.aspx?PaperID=56023](http://www.google.com/url?q=http%3A%2F%2Fwww.scirp.org%2Fjournal%2FPaperInformation.aspx%3FPaperID%3D56023&sa=D&sntz=1&usg=AFQjCNEZe9XzXa2_6P0nhr8QiX4fWf1Ogg)  
  
ABSTRACT  
In this article, we derive a block procedure for some K-step linear  
multi-step methods (for K = 1, 2 and 3), using Legendre polynomials as  
the basis functions. We give discrete methods used in block and  
implement it for solving the non-stiff initial value problems, being  
the continuous interpolant derived and collocated at grid and off-grid  
points. Numerical examples of ordinary differential equations (ODEs)  
are solved using the proposed methods to show the validity and the  
accuracy of the introduced algorithms. A comparison with fourth-order  
Runge-Kutta method is given. The ob-tained numerical results reveal  
that the proposed method is efficient.  
KEYWORDS  
Collocation Methods with Legendre Polynomials, Initial Value Problems,  
Perturbation Function, Fourth-Order Runge-Kutta Method  
Cite this paper  
Abualnaja, K. (2015) A Block Procedure with Linear Multi-Step Methods  
Using Legendre Polynomials for Solving ODEs. Applied Mathematics, 6,  
717-723. doi: 10.4236/am.2015.64067.  
  
  
45.6. Legendre Polynomials Iterative Technique for Solving a Class of  
Nonlinear Optimal Control Problems  
  
[http://www.sersc.org/journals/IJCA/vol7\_no3/3.pdf](http://www.google.com/url?q=http%3A%2F%2Fwww.sersc.org%2Fjournals%2FIJCA%2Fvol7_no3%2F3.pdf&sa=D&sntz=1&usg=AFQjCNHDd0yUoWvNc_ueAvCdRru8lAJptQ)  
  
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Electronics Engineering Department, Faculty of Engineering, Al Quds  
University, Jerusalem, Palestine  
[jaddu@eng.alquds.edu](https://mail.google.com/mail/u/0/h/vg9o7yihe2hv/?&cs=wh&v=b&to=jaddu@eng.alquds.edu), [amjadmajdalawi@hotmail.com](https://mail.google.com/mail/u/0/h/vg9o7yihe2hv/?&cs=wh&v=b&to=amjadmajdalawi@hotmail.com)  
Abstract  
A computational algorithm is proposed to solve a class of nonlinear  
optimal control problems. The proposed algorithm is based on replacing  
the original nonlinear optimal control problem by a sequence of  
time-varying linear quadratic optimal control problems. This is  
accomplished by employing an iterative technique developed by Banks  
[1-5] which is based on replacing the original nonlinear system by a  
sequence of linear time-varying systems. Then each of the time-varying  
linear quadratic optimal control problems is transformed into a  
standard quadratic programming problem by parameterizing the state  
variables by a finite length Legendre polynomials with unknown  
parameters. The solution of a standard nonlinear optimal control  
problem is presented, to show the effectiveness of the proposed  
method.  
Keywords: Nonlinear optimal control problem, Banks Iterative  
Technique, Legendre polynomials, State parameterization  
  
  
  
50.7. Nonlinear Orbital Dynamic Equations and State- Dependent Riccati  
Equation Control of Formation Flying Satellites1  
  
[http://www.temple.edu/csnap/publications/jas2003.pdf](http://www.google.com/url?q=http%3A%2F%2Fwww.temple.edu%2Fcsnap%2Fpublications%2Fjas2003.pdf&sa=D&sntz=1&usg=AFQjCNE2njDrZTgmqwiJ89aqwFWxTvpQ1Q)  
  
Nonlinear Orbital Dynamic Equations and State- Dependent Riccati  
Equation Control of Formation Flying Satellites1  
Abstract  
Chang-Hee Won and Hyo-Sung Ahn  
Department of Electrical Engineering University of North Dakota  
15 July 2004  
  
  
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Conditions For a Geostationary Satellite  
  
[http://www.sersc.org/journals/IJHIT/vol8\_no1\_2015/37.pdf](http://www.google.com/url?q=http%3A%2F%2Fwww.sersc.org%2Fjournals%2FIJHIT%2Fvol8_no1_2015%2F37.pdf&sa=D&sntz=1&usg=AFQjCNGQcaPAFWRbtfuPGTEkQh9woy3c5A)  
International Journal of Hybrid Information Technology Vol.8, No.1  
(2015), pp.417-426 [http://dx.doi.org/10.14257/ijhit.2015.8.1.37](http://www.google.com/url?q=http%3A%2F%2Fdx.doi.org%2F10.14257%2Fijhit.2015.8.1.37&sa=D&sntz=1&usg=AFQjCNHUuK_6YaubXEpvAyPTuHRruev36Q)  
  
Louardi Beroual1, Djamel Benatia2 and Hejdjazi Nourelhouda3  
Department of Electrical Engineering, Batna University, Algeria  
[1Louardi\_b@yahoo.fr](https://mail.google.com/mail/u/0/h/vg9o7yihe2hv/?&cs=wh&v=b&to=1Louardi_b@yahoo.fr), [2dj\_benatia@yahoo.fr](https://mail.google.com/mail/u/0/h/vg9o7yihe2hv/?&cs=wh&v=b&to=2dj_benatia@yahoo.fr)  
Abstract  
The dynamics of a GEO satellite will be studied in this work to obtain  
a dynamical model as accurate as possible. This model will be obtained  
in terms of Gauss’ variation of osculating parameter (VOP) equations  
containing the environmental perturbing accelerations, which are  
traditionally used to plan the station keeping maneuvers. The idea is  
to implement a controller for geostationary station keeping purposes  
based on a model written in terms of osculating orbital elements  
instead of averaged elements. Such a controller plans in an automatic  
way the station keeping (SK) maneuvers and it could be integrated on  
board in view of autonomous station keeping control loop.  
Keywords: classical orbital elements COE, equinoctial orbital elements  
EOE, environmental forces acting, perturbing accelerations,variation  
of parameter (VOP).  
  
  
  
55. 9. A set of r dynamical attitude equations for an arbitrary n-body  
satellite having r rotational degrees of freedom  
[http://arc.aiaa.org/doi/abs/10.2514/3.5873](http://www.google.com/url?q=http%3A%2F%2Farc.aiaa.org%2Fdoi%2Fabs%2F10.2514%2F3.5873&sa=D&sntz=1&usg=AFQjCNEe6wMtFWW4hDZ3_49rvd2UZ54BFw)  
  
  
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tethered satellite system in halo orbits  
  
[http://www.sciencedirect.com/science/article/pii/S1000936113001702](http://www.google.com/url?q=http%3A%2F%2Fwww.sciencedirect.com%2Fscience%2Farticle%2Fpii%2FS1000936113001702&sa=D&sntz=1&usg=AFQjCNGFtq0YCz055hi8jKWTekR4G8G6Jw)  
  
  
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