



SOUTH EAST ASIAN MATHEMATICAL SOCIETY

SEAMS SCHOOL PROPOSAL

**SPATIO TEMPORAL DATA MINING AND
OPTIMIZATION MODELING**

Universitas Padjadjaran, Indonesia
August 9-19, 2016

Organized by

Universitas Padjadjaran, Indonesia

2015

1. The proposed title, place and dates of the SEAMS School

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|---------------------------|--|
| Title of the SEAMS School | : Spatio Temporal Data Mining and Optimization Modeling |
| Place | : Universitas Padjadjaran Jl. Raya Bandung Sumedang Km 21 Jatinangor Sumedang 45363, West Java-Indonesia |
| Dates | : August 9-19, 2016 |

2. Organizers (write the names, place of work, and email address, if you have more than two then add the necessary lines)

| | |
|-----------------|---|
| 1. Name | : Prof. Dr. Budi Nurani Ruchjana, MS |
| Institution | : Universitas Padjadjaran |
| Email and Phone | : budinr@unpad.ac.id/bnurani@gmail.com/+6281320937740 |
| 2. Name | : Dr. Diah Chaerani, M.Si. |
| Institution | : Universitas Padjadjaran |
| Email and Phone | : d.chaerani@unpad.ac.id/ +6281394981591 |

3. Short Description of the **Scientific Content**, the **Aim** of the proposed school and the potential **Impact** to the local academic system and/or society. (max 100 words)

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| <p>Scientific Content</p> <p>The spatio temporal models have many applications and involve big data such as climate phenomena, education quality, environment, geology, hydrology, water resources and etc. For spatio temporal with a large database, we can use an approach of spatio temporal data mining using Knowledge Discovery in Database (KDD) methodology. In the other side, we can also develop a spatio temporal optimization model for mentioned phenomena above.</p> <p>Aims</p> <ol style="list-style-type: none"> 1. To introduce students to fundamental theories and research on spatio temporal data mining and optimization modeling 2. To provide young researchers to start their research on spatio temporal data mining and optimization modeling 3. To build a discussion forum for students and young mathematicians researchers on spatio temporal data mining and optimization modeling |
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Impact

1. The output of this SEAMS School is expected to give some impacts on education and research for undergraduate as well as master students to have an advanced learning experience both of theoretical and applications of spatio temporal data mining and optimization modeling with applications toward real data in Indonesia.
2. To build a communication of students and also young researchers from various countries at South East Asia on field of mathematics and computer sciences, especially for spatio temporal data mining and optimization modeling.

3. The speakers of the school (name, address, email, male/female). Give the percentage of female speakers.

1. Prof. Dr. Budi Nurani Ruchjana, MS, Universitas Padjadjaran, budinr@unpad.ac.id, Female.
2. Dr. Atje Setiawan Abdullah, MS, M.Kom., Universitas Padjadjaran, atjesetiawan@gmail.com, Male.
3. Dr. Setiawan, Institut Teknologi Sepuluh November Surabaya, setiawan@statistika.its.ac.id, Male
4. Dr. Diah Chaerani, M.Si., Universitas Padjadjaran, d.chaerani@unpad.ac.id, Female.
5. Prof. Dr. Eddy Hermawan, Atmospheric Modeling Division of Atmospheric Science and Technology, Center of National Institute of Aeronautics and Space (LAPAN) Bandung, eddy_lapan@yahoo.com, Male
6. Prof. Dr. Henk Folmer, Faculty of Spatial Sciences University of Groningen the Netherlands, h.folmer@rug.nl, Male

There is 33,3% of female speakers.

7. Describe in a few lines the local institution related to this school, including the main academic program and its strengths in teaching program and research. Give also the internet site of the local institutions. Do you plan to have a website of this SEAMS school?

Department of Mathematics FMIPA Universitas Padjadjaran (www.math.unpad.ac.id) has two main academic programs, i.e., Mathematics and Computer Sciences Study Programs. There are two field of research at Mathematics study program: Pure Mathematics (Analysis and Algebra) and Applied Mathematics (more in Mathematical Modeling, including Stochastic Modeling, Operations Research and Optimization Modeling (OROM), Mathematical Biology and Financial Mathematics. For Computer Sciences, we have research groups in Data Mining, Management Information System, Computer Visions, Robotics and Network, and Artificial Intelligence.

The SEAMS school on Spatio Temporal Data Mining and Optimization Modeling will organized by lecturer at Mathematics Department and collaboration with researcher from LAPAN Bandung and University Groningen. We will provide a module both of for lecture note and computer laboratory.

We plan to have a website of this SEAMS School, and for preliminary information, SEAMS School of Spatio Temporal Data Mining and Optimization Modeling can be accepted through the website of FMIPA Unpad: <http://www.fmipa.unpad.ac.id>

8. Provide information on the number and distribution of expected participants. Give the percentage of female participants who will attend the school.

1. Indonesian: 15 persons
2. Malaysian: 3 persons
3. Singapore: 1 person
4. Vietnam: 1 person
5. Cambodia: 1 person
6. Philipines: 2 persons
7. Thailand: 2 persons

Percentage of male and female participants is 50%

9. Describe the objectives and the program of the proposed school, including the courses (max 5 courses), speakers (in each course), abstracts (8 lines for each course) and tentative schedule of the whole proposed school.

Objectives:

Courses

1. Spatio Temporal Modeling (Prof. Dr. Budi Nurani R, M.S)

Abstract: In this course, we discuss an introduction of spatio temporal modeling based on time series phenomena. How to build the spatio temporal model using Box-Jenkins approach and to develop the Generalized Space time Autregressive models to be GSTARI, GSTAR-X, GSTAR-Kriging models based on real phenomena of data. How to estimate the parameter's model and to apply the model for forecasting in the future time including the influence of surrounding locations

2. Data Mining (Dr. Atje Setiawan Abdullah, MS, M.Kom.)

Abstract: in this course, we introduce the KDD method for mining big data/large data in three steps of data mining: pre-processing, data mining and post-processing. We propose some statistics tools for data mining for big data phenomena to get a knowledge for applying in real phenomena.

3. Optimization Modeling (Dr. Diah Chaerani)

Abstract: In this course, we discuss how to solve optimization problem in term of Linear Optimization and Nonlinear Optimization. Specific application on Spatial Optimization Problem will be discussed.

4. Spatial Econometrics (Prof. Dr. Henk Folmer/Dr. Setiawan)

Abstract: In this course we propose the spatial phenomena, spatial heterogeneity, and spatial dependence. We also discuss about the weight matrix , spatial correlation and spatial autoregressive models.

5. An Application of Spatio Temporal Data Mining and Optimization Modeling for Climate Change (Prof. Dr. Eddy Hermawan)

Abstract: In this discussion, we will give a description of climate change phenomena and how we get a big data of rainfall or temperature from satellite data, also how to predict the climate parameters using spatio temporal data mining modeling

Tentative Schedule

August 9, 2015 : Lecture on Spatio Temporal Modeling

August 10, 2015: Lecture on Data Mining

August 11, 2015 : Lecture on Spatial Econometrics Modeling

August 12, 2015: Lecture on Optimization Modeling

August 13-14, 2015: Assignment and Homeworks

August 15, 2015: Application of Spatio Temporal Data Mining and Optimization toward of Climate Change Phenomena

August 16 2015: Computer Laboratory: Implementation of Spatio Teporal Data mining and Optimization in Computer Simulation

August 16-17, 2015 : Projects assignment, coaching

August 18-19: Project Presentation

9. Provide information about provisional budget and the expected funding.

Provisional Budget

| No | Item | Details | Total |
|----------|---|--|-----------------|
| 1 | Tickets | | |
| | Overseas Participants Students from Asian Countries | 10 persons, average \$ 400 | \$ 4,000 |
| | Speakers (local) Dr. Setiawan | 1 persons | \$ 200 |
| 2 | Accommodation | | |
| | Participants Overseas | 10 person-12 days | \$ 2,400 |
| | Speakers From overseas and other city | 2 persons-12 days | \$ 1,200 |
| 3 | Food Expenses | | |
| | 35 persons (25 students, 6 lecturers, 4 assistants) | Lunch, 2 snacks during schools 12 days | \$ 2,520 |
| | | School dinner | \$ 350 |
| | | Lunch, snack during tour | \$ 350 |
| 4 | Local Transport | | |
| | Jakarta-Bandung (vice- versa) | 11 persons | \$ 550 |
| 5 | Supplies and Printings | Kit program, module for lecture and computer laboratory | \$ 350 |
| 6 | Secretariat and local Committee expenses | | \$ 500 |
| 7 | Social program (Exursion) | | |
| | 2 Car rental | 1 day | \$ 400 |
| | TOTAL | | \$12,820 |

Note: At least 2/3 of **CIMPA support** can be used for travel, accommodation and/or living expenses of young researchers (less than 38 or recent PhD) from neighbouring countries of the activity; at most 1/3 at most can be used for lecturers (economy class travel and/or standard living expenses).

CIMPA support cannot be used for: reimbursements for participants living in developed countries (even if their nationality is from a developing country); registration fees; proceedings; organizational expenses.

Expected Funding

| No | Item | Confirmed (Yes/Not Yet) | Total |
|----|--|-------------------------|----------|
| 1 | CIMPA | Not yet | \$ 5,500 |
| 2 | University/Institution Host and IndoMS (inkind) | Yes | \$ 1,500 |
| 3 | Hibah Konsorsium | Yes | \$ 1,320 |
| 4 | CDC IMU | Not yet | \$ 2,000 |

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| 5 | CRDF Global | Not yet | \$ 1,500 |
| | DGHE Indonesia | Not yet | \$ 2,000 |
| | TOTAL | | \$ 12,820 |

10. Provide CVs for the organizers (**2 pages max for each person**, including current publications).

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|----|------------------------------|---|--|
| 1. | Full Name | : | Prof. Dr. Budi Nurani Ruchjana |
| 2. | Place, date of birth | : | Sumedang, 23 December 1963 |
| 3. | Position | : | Dean of Faculty of Mathematics and Natural Sciences, Universitas Padjadjaran, 2012-2016 President of the Indonesian Mathematical Society (IndoMS) , 2012-2016 CDC IMU Member, 2015-2018 |
| 4. | Office address | : | Department of Mathematics, Fac. of Math and Natural Sciences, Universitas Padjadjaran, Jl. Raya Bandung-Sumedang Km. 21, Jatinangor-Sumedang 45363 |
| | Phone/Fax/Email | : | +62227794696 budinr@unpad.ac.id , bnurani@gmail.com |
| 5. | Last education | : | 2002, Doctor in Mathematics , Department of Mathematics, Institut Teknologi Bandung |
| 6. | Journal managing experience | : | Managing Editor Journal of the Indonesian Mathematical Society (JIMS) 2009-2012 Reviewer some of Indonesian Journal on Mathematics and Statistics |
| 7. | Foreign Language | : | English |
| 8. | Publications at past 5 years | : | <ol style="list-style-type: none"> 1. Kachiashvili, K. J. and Ruchjana, B. N. 2013. <i>Statistical Model and Simulation by SPSS</i>. Book for Undergraduate Program on Mathematics and Statistics. ISBN 978-602-7828-38-3, Published by Alfabeta, Bandung. 2. Ruchjana, B. N. 2012. Development on Spatio Temporal Modeling. <i>Proceedings of the 16th National Conference on Mathematics</i>. ISBN 978-602-19590-2-2, published by IndoMS and Department of Mathematics Universitas Padjadjaran, Jatinangor. 3. Jaya, I. G. N. M., Folmer, H. and Ruchjana, B. N., 2012. <i>Journal on Biostatistics</i>, ISSN 1907-6274 , Department of Statistics FMIPA Universitas Padjadjaran, Jatinangor. 4. Jaya, I.G.N.M, Ruchjana, B.N., Abdullah, A.S, and Toharudin, T. 2012. Spatial Statistical Analysis, Mapping and Modeling of Dengue Hemorrhagic Fever |

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| | <p>hagic Fever in Bogor West Java Indonesia. <i>Proceedings of the Fifth International Symposium on Computational Science and Its Applications</i>, Faculty of Mathematics and Natural Sciences, Universitas Gadjah Mada, ISSN: 2252-7761, p. 107-124, Yogyakarta.</p> <p>5. Ruchjana, B. N, Borovkova, S. A. and Lopuhaa, H. P. 2012. Least Squares Estimation of Generalized Space Time AutoRegressive (GSTAR) Model and Its Properties. <i>The 5th International Conference on Research and Educational in Mathematics</i>. AIP Conf. Proc. 1450. 61-64; doi: 10. 1063/1.4724118, American Institute of Physics.</p> <p>6. Chaerani, D., Ruchjana, B.N. and Wilhelmina, V. 2012. Multiobject Optimization Model for Allocation Problem of Land using Spatial Data. <i>Jurnal Teknik Industri</i>, Universitas Petra Surabaya, vol. 14 no. 1, p. 63-72, ISSN 2087-7439 (online).</p> <p>7. Ruchjana, B. N. And Abdullah, A. S. 2011. <i>Spatial Modeling based on Cross Section and Time Series Data</i>. SEAMS-GMU, UGM, Yogyakarta.</p> <p>8. Ruchjana, B.N. 2011. Stochastics Modeling using Linear Model Approach and Its Applications for Industry and Environmental. <i>Proceedings of the 15th National Conference on Mathematics</i>. ISBN: 978-602-96426-1-2, p.1-20. Published by IndoMS and Universitas Manado.</p> <p>9. Ruchjana, B.N. 2010. Poster Session on Energy National Seminar , Department Physics FMIPA Universitas Padjadjaran, Jatinangor.</p> <p>10. Darwis, S., Ruchjana, B.N and Permadi, A.K. 2009. Robust Decline Curve Analysis. <i>Journal of the Indonesian Mathematical Society (JIMS)</i>, vo. 15 no. 2, p. 105-111.</p> <p>11. Borovkova, S.A., Lopuhaa, H. P and Ruchjana, B.N. 2008. Consistency and Asymptotic Normality of Least Squares Estimators in Generalized STAR Models, <i>Statistica Neerlandica</i>, vol. 62 no. 4, p. 402-508.</p> |
| 9. | <p>Research Grant</p> <p><i>Spatio temporal data mining for mapping climate change impacts on water resources management at java island, 2015-2017</i> Funded by Higher Education Collaboration with Faculty of Spatial Sciences, University of Groningen, the Netherlands</p> |
| | <p><i>Theory and Applications of Spatial and Spatial Time Models, 2012-2013</i> Research International and Collaboration International Funded by Higher Education Collaboration with Faculty of Spatial Sciences, University of Groningen, the Netherlands</p> |
| | <p><i>Manager Team of Environmental Consultation of Central Java Unit (1x2000 MW) for Consortium GDF SUEZ, Adaro TBK, J-Power and Itochu at Batang District, Central Java Province</i> Research and Collaboration Centre of FMIPA Universitas Padjadjaran, 2009-2011</p> |
| | <p><i>Manager Team of Environmental Monitoring of Cirebon CPP Unit 1 (1x660 MW) at Kanci Kulon village, Astana Japura sub district, Cirebon district, West Java Province</i> Research and Collaboration Centre of FMIPA Universitas Padjadjaran, 2009-2011</p> |

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| | <i>Program Academic Recharging B from Higher Education, 2010</i> To write a research of Monograph "Study on Spatial Modeling and Its Application", Editor Prof. Dr. Henk Folmer University of Groningen the Netherlands |
| | <i>Development Study of Space Time Modelling in term of Multidimensional Scaling, 2008</i> Post Doctoral at Abdus Salam School and Mathematical Sciences, Lahore GC University, Pakistan |

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| 1 | Name | Dr. Diah Chaerani, M.Si (P) |
| 2 | Place and Date of Birth | Bandung, 5 Juni 1976 |
| 3 | Home Address | Jalan Haruman No. 25 Bandung 40262 |
| 4 | Phone Number (Home) | 022 732 1347 / - |
| 5 | Handphone Number | 0813 949 815 91 |
| 6 | Current Position | Head of Center for Study and Development Faculty Mathematics and Natural Sciences Universitas Padjadjaran |
| 7 | Office Address | Department of Mathematics Faculty of Mathematics and Natural Sciences Universitas Padjadjaran |
| 8 | Office phone and fax number | 022 7794696 |
| 9 | E-mail | d.chaerani@unpad.ac.id |
| 10 | Courses | Undergraduate 1. Operations Research 2. Linear Programming 3. Nonlinear Programming 4. Optimization 5. Stochastic Process Linear Control System |

A. EDUCATIONS

| | Bachelor | Master | Doctoral |
|--------------|---|---|---|
| University | Universitas Padjadjaran Indonesia | Institut Teknologi Bandung Indonesia | Delft University of Technology (TU Delft) The Netherlands |
| Major | Mathematics | Mathematics | Optimization Technology |
| | 1994-1998 | 1999-2001 | 2001-2006 |
| Thesis Title | Penerapan pemrograman dinamik untuk masalah <i>inventory control</i> . | Model Optimisasi Transmisi Gas | <i>Modeling Robust Design Problems via Conic Optimization</i> |
| Supervisor | 1. Drs. Lukman Wirahadinata 2. Drs. Atje Setiawan, MS. | Prof. Dr. S.M Nababan | Prof. Dr. ir. C. Roos |

B. RESEARCH EXPERIENCES (THE LAST 5 YEARS)

| YEAR | TITLE | POSITION | FUNDED BY |
|-------|---|------------|---|
| 2015 | ON THE THEORETICAL AND APPLICATIONS DEVELOPMENT OF ROBUST OPTIMIZATION IN INDUSTRY AND ENVIRONMENT (PI) | PI | DIKTI COMPETENCY RESEARCH GRANT 2015 |
| 2015 | A STUDY ON PHYSICAL AND CHEMICAL PROPERTIES OF JATINANGOR LAND FOR DEVELOPMENT OF LAND USE UNIVERSITAS PADJADJARAN (RESEARCHER) | RESEARCHER | PENELITIAN UNGGULAN PERGURUAN TINGGI TA 2015 |
| 2013- | OPTIMIZATION MODEL FOR | PI | PENELITIAN UNGGULAN PERGURUAN |

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| 2014 | VACCINATION STRATEGY PROBLEM USING INTERIOR POINT METHODS APPROACH (PI) | | TINGGI (PUPT) PROGRAM DESENTRALISASI UNPAD 2014 |
| 2012 | DETERMINING MODEL AND DESIGN OF ROBUST FORESTRY TACTICAL PLANNING PROBLEM BASED ON CLEAN DEVELOPMENT MECHANISM | PI | HIBAH BERSAING PROGRAM DESENTRALISASI UNPAD 2012 |
| 2012 | OPTIMISASI TUMBUH KEMBANG BATITA DENGAN PENDEKATAN FUZZY LOGIC UNTUK ANDROID | RESEARCHER | HIBAH BERSAING PROGRAM DESENTRALISASI UNPAD 2012 |
| 2011 | MODEL OPTIMISASI MULTIOBJEKTIF ALOKASI PENGGUNAAN LAHAN DENGAN DATA SPASIAL | PI | PENELITIAN SWADANA FMIPA UNPAD |
| 2011 | A SMART AND OPTIMAL TRAIN TRANSPORTATION MANAGEMENT SYSTEM AT | RESEARCHER (PRINCIPAL INVESTIGATOR: ENDRA JOELIANTO, IR., PHD) | HIBAH BERSAING RESEARCH GRANT INSTITUT TEKNOLOGI BANDUNG INDONESIA 2011 |
| 2009 & 2010 | CHARACTERIZATION OF A NEW NUMERICAL METHODS TO SOLVE AN UNCERTAIN OPTIMIZATION PROBLEMS WHICH INVOLVED BINARY VARIABLES | PRINCIPAL INVESTIGATOR | FUNDAMENTAL RESEARCH GRANT 2009 & 2010 UNIVERSITAS PADJADJARAN |

C. PUBLICATIONS

| No . | TAHUN | JUDUL ARTIKEL ILMIAH | VOLUME/ NOMOR | NAMA JURNAL |
|------|-------|--|--|--|
| 1 | 2015 | D.CHAERANI, S.P DEWANTO, <i>ACTIVE LEARNING BASED ON RESEARCH FOR LINEAR OPTIMIZATION COURSE AT DEPARTMENT MATHEMATICS UNIVERSITAS PADJADJARAN</i> | PROCEEDINGS INTERNATIONAL CONFERENCE ON ADVANCES IN EDUCATION TECHNOLOGY (ICEAT-2014), PP 58-61, ATLANTIS PRESS, ISBN (ONLINE) 978-94-62520-44-8, ISSN 2352-5398., DOI:10.2991/ICAET-14.2014.12. | PROCEEDINGS INTERNATIONAL CONFERENCE ON ADVANCES IN EDUCATION TECHNOLOGY (ICEAT-2014), |
| 2 | 2014 | D. CHAERANI, N.ANGGRIANI, FIRDANIZA, <i>ON THE ROBUST OPTIMIZATION TO THE UNCERTAIN VACCINATION STRATEGY PROBLEM</i> | AMERICAN INSTITUTE OF PHYSICS (AIP) CONF. PROC. 1587, 34-37 (2014); HTTP://DX.DOI.ORG/10.1063/1.4866528 | AMERICAN INSTITUTE OF PHYSICS (AIP) CONF. PROC. |
| 3 | 2013 | D. CHAERANI, C. ROOS, <i>HANDLING UNCERTAIN OPTIMIZATION PROBLEM VIA ROBUST COUNTERPART METHODOLOGY</i> | VOL. 15, No. 2, DESEMBER 2013, HAL 111-118 DOI: 10.9744/JTI.15.2.111-118 ISSN 1411-2485 PRINT / ISSN 2087-7439 ONLINE | <i>JURNAL TEKNIK INDUSTRI (JTI) UNIVERSITAS KRISTEN PETRA SURABAYA. TERAKREDITASI B DIKTI, INTERNATIONAL PEER-REVIEWED JOURNAL</i> |
| 4 | 2013 | CHAERANI, D., ANGGRIANI, N., FIRDANIZA., <i>MINIMIZING LINEAR OPTIMIZATION MODEL OF BASIC REPRODUCTION NUMBER IN A FIXED NUMBER OF VACCINATION COVERAGE USING INTERIOR POINT METHOD APPROACH.,</i> | | <i>ISS IPB PROCEEDINGS.</i> |
| 5 | 2013 | P. GUNOTO, E. JOELIANTO, D. CHAERANI <i>TRAIN SPEED OPTIMIZATION FOR RAILWAY TIMETABLE RESCHEDULING USING MODEL PREDICTIVE CONTROL-MAX PLUS LINEAR</i> | PROCEEDINGS OF 2ND 2013 IEEE CONFERENCE ON CONTROL, SYSTEMS AND INDUSTRIAL INFORMATICS (ICCSII), PP 76-79, 2013 | PROCEEDINGS OF 2ND 2013 IEEE CONFERENCE ON CONTROL, SYSTEMS AND INDUSTRIAL INFORMATICS (ICCSII), PP 76-79, 2013 |
| 6 | 2013 | E. JOELIANTO, A. SETIAWAN, D.CHAERANI, <i>HARDWARE IN THE LOOP SIMULATION OF MILP ALGORITHM RAILWAY TRAFFIC RESCHEDULLING DURING DISTURBANCES</i> | VOLUME 35 ISSUE No 5, MEI 2013 | <i>IJAMAS (INTERNATIONAL JOURNAL ON APPLIED MATHEMATICS AND STATISTICS)</i> |

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| 7 | 2012 | C. ROOS, Y. BAI, AND D. CHAERANI. ROBUST ELECTRICAL NETWORK TOPOLOGY DESIGN BY CONIC OPTIMIZATION. | VOL (75) No (1) PP 125-146, 2012 | A SPECIAL ISSUE OF SQU JOURNAL FOR SCIENCE |
| 8 | 2012 | D. CHAERANI, B. NURANI, V. WILHELMINA, MODEL OPTIMISASI MULTIOBJEKTIF UNTUK MASALAH ALOKASI PENGGUNAAN LAHAN DENGAN MENGGUNAKAN ANALISIS DATA SPASIAL, | VOL. 16 No 1, JUNI 2012, PP 63-72, DOI: 10.9744/JTI.14.1.63-72 | JURNAL TEKNIK INDUSTRI UNIVERSITAS PETRA SURABAYA, TERAKREDITASI B OLEH DIKTI, |
| 9 | 2010 | D.CHAERANI, <i>RECIPES FOR BUILDING THE DUAL OF CONIC OPTIMIZATION PROBLEM</i> | VOL. 16 No 1, APRIL 2010, PP. 9-23 | <i>JOURNAL OF INDONESIAN MATHEMATICAL SOCIETY (JIMS)</i> , TERAKREDITASI B OLEH DIKTI |