

Hak Cipta Dilindungi Undang-Undang

1. Dilarang mengutip sebagian atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber:
 - a. Pengutipan hanya untuk kepentingan pendidikan, penelitian, penulisan karya ilmiah, penyusunan laporan, penulisan kritik atau tinjauan suatu masalah.
 - b. Pengutipan tidak merugikan kepentingan yang wajar IPB.
2. Dilarang mengumumkan dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun tanpa izin IPB.



90 Tahun Pendidikan Tinggi Teknik Di Indonesia



Proceedings

of The Third International Conference on
Mathematics and Natural Sciences

(ICMNS 2010)

SCIENCE FOR SUSTAINABLE DEVELOPMENT

ITB, Bandung, Indonesia, 23-25 November 2010

ISBN : 978-979-17090-3-3



Hak Cipta Dilindungi Undang-Undang

1. Dilarang mengutip sebagian atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber:
 - a. Pengutipan hanya untuk kepentingan pendidikan, penelitian, penulisan karya ilmiah, penyusunan laporan, penulisan kritik atau tinjauan suatu masalah.
 - b. Pengutipan tidak merugikan kepentingan yang wajar IPB.
2. Dilarang mengumumkan dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun tanpa izin IPB.

Proceedings

of the

Third International Conference on Mathematics and Natural Sciences (ICMNS 2010)

Proceedings of a conference held on November 23-25, 2010 in Bandung,
Indonesia

Science for Sustainable Development

Editors

Siti Khodijah Chaerun
Ihsanawati

Coordinator

Roberd Saragih

Published by

Faculty of Mathematics and Natural Sciences
School of Life Sciences and Technology
School of Pharmacy
INSTITUT TEKNOLOGI BANDUNG



Hak Cipta Dilindungi Undang-Undang

1. Dilarang menyalin, mengutip, atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber:
 - a. Penelitian hanya untuk kesenangan pribadi
 - b. Penelitian untuk kepentingan IPB yang wajar
 - c. Penelitian untuk kepentingan IPB yang wajar
 - d. Penelitian untuk kepentingan IPB yang wajar
2. Dilarang mengumumkan dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun tanpa izin IPB.

Proceedings: Third International Conference on Mathematics and Natural Sciences (ICMNS 2010) by the ICMNS 2010 Organizing Committee
 All rights reserved. Published 30 April 2011

978-979-17090-3-3

The ICMNS 2010 Organizing Committee
 Faculty of Mathematics and Natural Sciences (FMIPA), Institut Teknologi Bandung
 School of Life Sciences and Technology (SITH), Institut Teknologi Bandung
 School of Pharmacy (SF), Institut Teknologi Bandung


Preface

On behalf of the conference organizing committee, we are happy to present the Proceedings of the Third International Conference on Mathematics and Natural Sciences (ICMNS 2010). The organizing committee of the ICMNS 2010 is highly pleased to have nearly two hundreds full papers submitted to the Conference. The ICMNS's biannual event is organized jointly by the Faculty of Mathematics and Natural Sciences (FMIPA), the School of Life Sciences and Technology (SITH), and the School of Pharmacy (SF), Institut Teknologi Bandung. We are highly honored to host the event here in Bandung.

The aim of the ICMNS 2010 is to promote interdisciplinary researches in science and technology, to encourage the development of sciences and technologies for sustainable development, and to disseminate research in various fields of mathematics and natural sciences. The main theme of the ICMNS 2010 is "Science for Sustainable Development". The conference deals with mathematics and natural sciences to fundamental and applied researches, including nine scopes and topics that are health sciences, biosciences and biotechnology, environmental science, pharmaceutical science, physical sciences, material science, mathematics, computer and computational science, and earth and space sciences.

Finally, we would like to express our gratitude to Dean of FMIPA, Dean of SF, Dean of SITH, Chevron, PT Biofarma, and Indonesian Journal of Physics (IJP) for the financial support. I thank the invited speakers as well as participants for their contribution in making the conference a success. As general chairperson, I highly appreciate the great efforts of the members of the organizing committee whose hard work really made it possible to have this conference.

Bandung, April 30, 2011


Robert Saragih

Chairperson, ICMNS 2010

Hak Cipta Dilindungi Undang-Undang

1. Dilarang mengutip sebagian atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber:

- a. Pengutipan hanya untuk kepentingan pendidikan, penelitian, penulisan karya ilmiah, penyusunan laporan, penulisan kritik atau tinjauan suatu masalah.
- b. Pengutipan tidak merugikan kepentingan yang wajar IPB.
- c. Dilarang mengumumkan dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun tanpa izin IPB.



2010 3rd ICMNS Committee

Organizing Committee Members

Prof. Dr. Roberd Saragih
 Dr. Hesti Retno Tri Wulandari
 Dr. Priastuti Wulandari
 Dr. Ilma Nugrahani
 Dr. Siti Khodijah Chaerun
 Dr. Ihsanawati
 Dr. Khreshna Imaduddin Ahmad S.

Scientific Committee Members

Prof. Dr. Ismunandar, Institut Teknologi Bandung (ITB)
 Prof. Dr. Edy Soewono, ITB
 Prof. Dr. Hendra Gunawan, ITB
 Prof. Dr. Yana Maolana Syah, ITB
 Prof. Dr. Doddy Sutarno, ITB
 Prof. Dr. Sundani Nurono, ITB
 Prof. Dr. Suharja D. Wiramiharja, ITB
 Prof. Dr. Roberd Saragih, ITB
 Prof. Dr. Zaki Su'ud, ITB
 Dr. Dwinovia Simanjuntak, ITB
 Dr. Aaryono Hadi, ITB
 Dr. Nyoman P. Aryantha, ITB

Steering Committee Members

Prof. Dr. D. Barrie Johnson, Bangor University, UK
 Prof. Dr. William B. Whitman, University of Georgia, USA
 Prof. Dr. David Guest, The University of Sydney, Australia
 Dr. Hervé Vanderschuren, Eidgenoessische Technische Hochschule, Zürich, Switzerland
 Dr. Reynier F. Peletier, University of Groningen, The Netherlands
 Dr. Floris P. J. T. Rutjes, Radboud University, Nijmegen, The Netherlands
 Dr. Hidehiro Uekusa, Tokyo Institute of Technology, Japan
 Dr. Toru Watanabe, Nihon University, Japan
 Dr. Hidetaka Akita, University of Hokkaido, Japan
 Dr. Yoshimune Nonomura, Yamagata University, Japan
 Dr. Kosuke Mizuno, Kyoto University, Japan
 Dr. Tjandra Setiadi, Institut Teknologi Bandung, Indonesia
 T. Handoko, Indonesian Institute of Sciences, Indonesia

Hak Cipta Dilindungi Undang-Undang

1. Dilarang mengutip sebagian atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber:

a. Pengutipan hanya untuk kepentingan penelitian, pengajaran, atau karya ilmiah.

b. Pengutipan tidak merugikan kepentingan yang wajar IPB.

2. Dilarang mengutip dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun.



Contents

Preface.....	i
2010 3 rd ICMNS Committee.....	ii
Contents.....	iii
ABSTRACTS AND EXTENDED ABSTRACTS OF INVITED SPEAKERS.....	1
1 Biomining: an established and dynamic biotechnology <i>D. Barrie Johnson</i>	2
2 Technologies for realizing the sustainable society <i>Tjandra Setiadi</i>	5
3 Modeling small scale physics using field theory approach <i>L. T. Handoko</i>	6
4 Developments in Astronomy in the Netherlands <i>Reynier F. Peletier</i>	7
5 Plant-microbe interactions: the significance to sciences and applications <i>David Guest</i>	8
Development of new tuberculosis vaccine based on dendritic cell targeting <i>Neni Nurainy</i>	9
Total synthesis of platencin and dehydrohomoplatencin <i>Floris P. J. T. Rutjes</i>	11
Polymorphic transition of pharmaceutical crystals investigated by structure determination from powder diffraction data <i>Hidehiro Uekusa and Kotaro Fujii</i>	13
Research on dynamical behavior of elastic vehicle utilizing an automatic controlled experimental vehicle and multibody dynamics <i>Taru Watanabe, Takanori Kamoshida, Hiroshi Tajima and Kazuto Seto</i>	15
The number of prokaryotes on earth (and why we care) <i>William B. Whitman</i>	16
The contribution of <i>OMICs</i> and biotechnology to cassava improvement <i>Hervé Vanderschuren</i>	25
Multifunctional envelope-type nano device (MEND) <i>Hideyoshi Harashima and Hideyoshi Harashima</i>	27
Multiple emulsions stabilized by microbowls <i>Yashimune Nonomura, Naoto Kobayashi and Naoki Nakagawa</i>	29
Design study of medium-sized Pb-Bi cooled fast reactors with natural uranium as fuel cycle input using modified candle burn-up scheme <i>Zaki Su'ud and H. Sekimoto</i>	31
Sea study and sustainable humanosphere <i>Kosuke Mizuno</i>	32
SECTION 1. HEALTH SCIENCES.....	34
In vitro antibacterial activity of propolis <i>Apis mellifera</i> extract on the growth of <i>Methicillin-Resistant Staphylococcus aureus</i> (MRSA) <i>Arina Novilla, As'ari Nawawi and Ganthina Sugihartina</i>	35
3-epiocotillol from the bark of <i>Aglaia smithii</i> (Meliaceae) and toxic activity against	



	<i>Artemia salina</i> and cytotoxic activity against murine leukemia cells P-388 D. Harneti, R. Tjokronegoro, A. Subarnas and U. Supratman	43
3	Spatial autocorrelation of the DHF outbreaks in the city of Surabaya Diaz Fitra Aksioma and Nur Iriawan	48
4	Mutational profiles of the <i>PNCA</i> gene from L20 and R9 multi drug resistance- <i>Mycobacterium tuberculosis</i> isolates Eli Hendrik Sanjaya, Ihsanawati and A. Saifuddin Noer	57
5	Polymorphisms of human mitochondrial DNA analysis in papuan populations Epiphani I. Y. Palit, Hendrikus M. B. Bolly and Yohanis Ngili	62
6	Design of linear peptide as neuraminidase inhibitor influenza a virus base on molecular docking simulation Rosmalena, Fadilah and Aryo Tedjo	69
7	Neuroprotective effect of gotukola (<i>Centella asiatica</i> (L.) Urban) in cerebral ischemic rat model Hegar Pramastya, Kusnandar Anggadiredja and Irda Fidriany	77
8	Survival analysis and factors influencing the recovery of dengue hemorrhagic fever patient by using bayesian mixture survival Suci Amalia, Nur Iriawan and Dedy Dwi Prastyo	91
9	Do the colors of hepatopancreas reflect its energy content? (Study on embryos bearing female of Australian red claw crayfish (<i>Cherax quadricarinatus</i>)) Tjendra Anggraeni, Ahmad Ridwan and Muhammad Idris	98
10	Attention response study on human cortex by electroencephalograph using single stimulus evoked potential analysis Ufa Octaviani, Lulu L. Fitri and Suprijanto	108
11	Human mitochondrial DNA analysis on different tissues (a study on the overall DNA fragments and its nucleotide mutations) Yohanis Ngili, A. Saifuddin Noer, Yoni F. Syukriani, Dessy Natalia, Adang S. Ahmad and Yana M. Syah	116
12	Construction and cloning of catalase-peroxidase encoded by the <i>katG</i> gene from <i>Mycobacterium tuberculosis</i> H37Rv and MDR- <i>M. Tuberculosis</i> Ihsanawati, Purkan, Winni Astuti, Achmad Saifuddin Noer and Dessy Natalia	125
	SESSION 2. BIOSCIENCES AND BIOTECHNOLOGY	133
	The influence of <i>Agrobacterium tumefaciens</i> strains on the high efficiency of genetic transformation of <i>Artemisia annua</i> L. Agus Chahyadi, Elfahmi and Sony Suhandono	134
	Effect of pasak bumi root extract (<i>Eurycoma longifolia</i> Jack) on cognition and glutamic acid level in the hippocampus of 4 weeks old male wistar rats (<i>Rattus norvegicus</i> L.) Anisa Nurani, Lulu Lusianti Fitri and Suswini Kusmaningati	144
	Bacterial community analysis from hot springs of Domas crater, Tangkuban Parahu by DGGE Chitra Risnayanti and Akhmaloka	152
	Fatty acid composition induced in somatic embryo of <i>Jatropha curcas</i> in bioreactor Devi Ismidianty and Rizkita Rachmi Esyanti	158
	Characterization of bee pollen from Ranca Bungur, Bogor Devi Kamilia A., Sukrasno and Irda Fidrianny	173
	The effect tryptophan feeding on growth, protein content and TDC activity of <i>Catharanthus roseus</i> (L) G. Don cell aggregate culture in the airlift bioreactor	

	<i>Dingse Pandiangan, Wenny Tilaar, Karyono, Rizkita Rahmi Esyanti and Anas Subarnas</i>	186
7	The effect of adding jackfruit at rabbit abon on the chemical composition and acceptability as an animal food product diversification <i>Eka Wulandari and Nani Djuarnani</i>	197
8	Antifungal activity of aqueous extract of <i>Bufo melanostictus</i> frog skin <i>Ekawati Utami, Astuti Kusumorini, Kusnandar Anggadiredja and Anggraini Barlian</i>	202
9	Physical characteristics of capsule of keladi tikus extract (<i>Typhonium divaricatum</i> (L.) Decne) from spray drying method using maltodextrine <i>Faizatun, Yunahara Farida and Maida Aulia Rahim</i>	212
10	Detection of <i>Salmonella enterica</i> serovar Enteritidis quinolone resistance from pediatric diarrhea patients using molecular method <i>Fenny Dwivany and Gabriella Gita Febriana</i>	218
11	Identification and optimization of indigenous probiotic bacteria against vibriosis syndrome isolated from <i>Litopenaneus vannamei</i> hatchery in Situbondo, east java, Indonesia <i>G. Suantika, P. Aditiawati, D. I. Astuti, J. Anggraeni, R.F. Khoirunnas, I. Williantarra and M. Sugata</i>	226
12	Production of soursop juice (<i>Anona muricata</i> Linn) yoghurt through lactic acid fermentation <i>Hertati Chairunnisa and Eka Wulandari</i>	234
13	Polymorphisms analysis of human mitochondrial DNA hypervariable region I and II from northern Papua and its implication on native Papuan haplogroups <i>Hendrikus M. B. Bollya, Epiphani I. Y. Palitb, Richardo Ubyaanb and Yohanis Ngilia</i>	240
14	Measuring echo strength of fish and sea bottom using underwater acoustic instrument <i>Henry M. Manik</i>	250
15	Optimization of <i>Rosa hybrida</i> CV. Mawar Merah Besar micropropagation <i>Listya Utami Karmawan and Irene Natasha Dorothy Souhuwat</i>	257
16	Optimization of inoculum size, initial pH of medium, incubation temperature, and carbon sources in production of cellulase enzyme by <i>Bacillus</i> sp. RP1 <i>Maelita Ramdani Moeis, Dessy Natalia and Wulan Nur Mahmudah</i>	270
17	The effect of temperature on the crystal growth of coconut shell carbon <i>Mytj Jeanne Rampe, Bambang Setiaji, Wega Trisunaryanti and Triyono</i>	276
18	Study on amortization in irrigation technology system <i>Negroho Tri Waskitho, Sigit Supadmo Arif, Moch. Maksum and Sahid Susanto</i>	285
19	Hydrolysis of fibers sago by enzymatic <i>Priya Endang Susilowati, Sarni marwanti, Ardiansyah and Sapto Raharjo</i>	296
20	Mutation of <i>katG</i> gene in <i>Mycobacterium tuberculosis</i> that promoting inactive of catalase/peroxidase leads to isoniazid resistance <i>Prerkan, Ihsanawati, Debbie Soefie Retnoningrum, Dessy Natalia and Achmad Saifuddin Noer</i>	304
21	AB initio modeling of complex I human mitochondrial DNA using I-Tasser methods <i>Ratih D. Mutia, Iman P. Maksum and M. Yusuf</i>	312
22	Antimicrobial affectivity of kecombrang (<i>Nicolaia speciosa</i>): The effect part of kecombrang plants into food bacteria and fungi <i>Rifda Naufalin and Herastuti Sri Rukmini</i>	326
23	Profiling DGGE bands for analyzing structure community during manure compost	



24	period <i>Safika, Fida Madayanti, Pingkan Aditiawati and Akhmaloka</i>	336
25	Isolation of thermostable α - amylase from local thermophilic bacteria for liquefaction <i>Sapto Raharjo, Ardiansyah, Prima Endang and Tien</i>	342
26	Efficiency hypothesis to explain why Sulawesi crested black macaques (<i>Macaca nigra</i>) rambo group at Tangkoko-Batuangus Nature Reserve split into two smaller groups <i>Saroyo and Trina E. Tallei</i>	355
27	Bacterial bioleaching of sulfide mineral ores by mixotrophic bacterial consortia <i>Siti Aisyah Alting and Siti Khodijah Chaerun</i>	362
28	The effectiveness of watermelon endocarp extract in inhibiting lipase activity relative to the hypolipidemic drugs <i>Subandi and Indah Langitasari</i>	372
29	PCR amplification of archaeal DNA polymerase B genes fragment from natural sample of Domas hot spring <i>Suharti, Rukman Hertadi, Fida Madayanti Warganegara, Santi Nurbaiti and Akhmaloka</i>	383
30	Using lichen as bioindicator for detecting level of environmental pollution <i>Taufikurrahman, Muhammad Fernando and Rima Mustika Sari</i>	388
31	The evaluation of alkaline comet assay Yusuf protocol to detect DNA damage in epididymal sperm in Swiss Webster mice with landfill leachate treatment <i>Tezkiyah Izzati and Ayda T. Yusuf</i>	395
32	Optimization of bacterial doses and incubation time on ethanol fermentation of nipah for biofuel energy <i>Wiludjeng Trisasiwi, Ari Asnani and Retna Setyawati</i>	403
33	Single base mismatch detection on the mtDNA A3243G mutation using electrochemical DNA biosensor based on target guanine signal <i>Yeni Wahyuni Hartati, Santhy Wyantuti, Iman Permana Maksam, Rizal Habeahan and Siti Rochani</i>	419
	SESSION 3. ENVIRONMENTAL SCIENCES.....	427
	Habitat mapping and strategies of resources use by Sumatran elephants (<i>Elephas maximus sumatranus</i> Temminck, 1847) <i>Adullah, Djoko T. Iskandar, A. Sjarmidi, Djufri and Asiah M.D.</i>	428
	Combination of anaerobic digestion using upflow anaerobic sludge blanket reactor with floculation-flocculation process for tofu wastewater treatment <i>Berlian Sitorus, Deasy Basaria, Imelda Silalahi, Dian Rahayu Jati and Korneel Robaey</i>	436
	Absorption characteristic of radiocesium onto kaolinite typed clay <i>Budi Setiawan</i>	447
	Prokaryote-mediated genetic transformation of Indonesian black orchid <i>Coelogyne andurata</i> Lindley <i>Endang Semiarti, Ari Indrianto, Eko Agus Suyono, Risqie Lingga Nurwulan, Ixora Mercuriani, Ratih Restiani, Yasunori Machida and Chiyoko Machida</i>	455
	Development Banjarbaru administration city based on green space <i>Krisdianto, Ninis H. Haryanti, Ichsan Ridwan, Achmad Samsu Hidayat and Hafizh Prasetia</i>	466
	Application genetic algorithms to the optimization of defect preventive maintenance in manufacturing environment	

	<i>Prana Fistianduta, Purnomo Budi Santoso and Murti Astuti</i>	488
7	A model of host searching behaviour of generalist egg parasitoid <i>Trichogramma pretiosum</i> <i>R.R. Rukmowati Brotodjojo</i>	506
SESSION 4. PHARMACEUTICAL SCIENCES.....		519
1	Minimum Inhibitory Concentration (MIC) of powder ethanol extracts of <i>Kalanchoe pinnata</i> againsts <i>Streptococcus mutans</i> <i>Firdaus, Kartiningsih and Novi Yantih</i>	520
2	Quantitative structure activity relationships of rocaglamide derivatives against various cancer cells <i>Firdayani, Susi Kusumaningrum, Doddy Irawan Setyo Utomo, Chaidir and Agung Eru Wibowo</i>	524
3	Antifungal activity of <i>Piper betle</i> L. var <i>rubrum</i> cream against rabbit's vaginal candidiasis <i>Ganawan P. Widodo and Aneng A. Sukmawanti</i>	530
4	Vinyl bromination of andrographolide <i>Jatti Levita, As'ari Nawawi, Abdul Mutalib and Slamet Ibrahim</i>	535
5	Lozenges formulation of <i>Kalanchoe pinnata</i> P. crude extract as an antiseptic with freeze drying method and maltodextrin as binder <i>Kartiningsih, Nurul Hidayatri, Puji Asriyanti, Novi Yantih and Firdaus</i>	545
	Chemical constituents in flesh dammar extracts and their potencies as antibacterial agent <i>Nuryawati Mulyono</i>	552
	General standard parameters of aqueous and ethanol extracts of <i>Kalanchoe pinnata</i> <i>Novi Yantih, Diah Widowati, Anggelina Oktorita, Firdaus and Kartiningsih</i>	558
	Improvement of quality of antidiabetic jamu through subchronic toxicity test in sprague dawley rat <i>Rilianawati and Sri Ningsih</i>	564
	Influence of SLS adsorption onto ketoprofen surface to its dissolution rate <i>Titi Sudiati, Jessie Sofia Pamudji and Rachmat Mauludin</i>	570
SESSION 5. PHYSICAL SCIENCES.....		578
	Format for the basic physics lecture – aiming at science awareness: Some study results <i>Aloysius Rusli</i>	579
	Medical image compression based on trained dictionary compressive sampling <i>Antonius Darma Setiawan, Andriyan Bayu Suksmono, Tati L. R. Mengko and Hendra Gunawan</i>	587
	Effect of film thickness on electrical characteristic of Fe ₂ O ₃ thick film ceramics made from local mineral in air and ethanol atmosphere <i>Endi Suhendi, Hera Novia and Dani Gustaman Syarif</i>	600
	Self-siphon experiments and its mathematical modeling using parametric equation <i>Fannia Masterika, Novitrian and Sparisoma Viridi</i>	608
	Experimental method for determining inductance of Resistive-Inductors (RI) <i>Haerul Pathoni, Sparisoma Viridi and Khairul Basar</i>	614
	Influence of firing atmospheres and gamma radiation on V-I characteristic of CuFe ₂ O ₄ thick film ceramics <i>Hety Puspitasari, Dani Gustaman Syarif and Kardiawarman</i>	620

7	Simple experiment apparatus in measuring speaker vibration amplitude using laser beam and mirror <i>Sitti Balkis, Wahyu Srigitomo and Sparisoma Viridi</i>	626
8	Detector design of centrifugal force <i>Sony Wardoyo, Abraham and Yohanis Ngili</i>	633
9	Analysis of wireless data transmission system using T/RLP912A circuit and its computer acquisition system <i>Warsito, Sri Wahyu Suciwati and Dodi Yudo Setyawan</i>	639
SESSION 6. MATERIAL SCIENCES		650
1	Application of 1,2,4-triazole iron(II) tetrafluoroborate coordination compound for chemistry teaching <i>Lindayanti Labanu and Djulia Onggo</i>	651
2	The synthesis and characterization of aminated polyether sulfone as solid support material for lipase immobilization <i>Nurrahmi Handayani, Buchari, Deana Wahyuningrum and Muhammad Ali Zulfikar</i>	657
3	Removal of ion cadmium(II) from water onto Chitosan Magnetite Nanocomposite (CMNs) in fixed beds <i>Amidar, Sri Hamda and Erdawati</i>	672
	Study of electrical properties of GaAs _{1-x} Sb _x thin film grown by mocvd using TMGa, TDMAAS, and TDMASb <i>Andi Suhandi, Endi Suhendi and Pepen Arifin</i>	684
	The effect of 1,8-diiodooctane as additive molecule on performance of bulk-heterojunction poly(3-hexylthiophene): Fullerene solar cells <i>Avi Bahtiar and Annisa Aprilia</i>	693
	Calcium release from cell walls of pea epicotyls caused by proton extrusion during fusicoccin action <i>Idam Arif</i>	702
	EIS Study of temperature and H ₂ S concentration effect on API 5LX65 carbon steel corrosion in chloride solution <i>Agus Solehudin, Isdiriyani Nurdin, Muljadji Agma and Wawang Suratno</i>	709
	Quartz crystal microbalance array sensor for the verification of medicinal plant extracts <i>AKM Shafiqul Islam, Mohd Noor Ahmad and Ali Yeon Md Shakaff</i>	724
	The effect of functional groups transformation on ascorbic acid into 5,6- <i>o</i> -propylidene ascorbic acid towards the corrosion inhibition activity on carbon steel in sodium chloride environment <i>Alnendo Rafki, Bunbun Bundjali and Deana Wahyuningrum</i>	728
	Relating resin as a preconcentration system for the determination of trace lead based flow injection analysis method <i>Aman Sentosa Pangabean, Subur Pasaribu and Muhammad Bachri Amran</i>	749
	Synthesis of proton-exchange membrane based on carboxymethylcellulose benzoate-chitosan acid-base complex for fuel cell applications <i>Anggi Maria Gunita, Devi Herlianty Stefanus and Veinardi Suendo</i>	759
	Observation of surface plasmon resonance in gold and silver thin films using a handy home-made computerized optical device set-up in the kretschmann configuration <i>Desi Dwi Yulastuti, Nafingati Zakiyah, Almaratus Sholihah Rifqi Rufaida, Muhammad Arifin and Kamsul Abraha</i>	774



13	Removal of an Acid Orange 10 (AO10) by coagulation–flocculation using chitosan nanoparticles <i>Sri Hamdah and Erdawati</i>	782
14	Improved thermal properties of chitosan filled polypropylene (PP) composites by chemical modification with acetic acid <i>Faisal Amri, Salmah Husseinsyah and Kamarudin Husin</i>	794
15	Cyclic voltammetry study of chlorambucil in the presence of 4-chloro butyronitrile as a nucleophile <i>Henry Setiyanto, Vienna Saraswaty, Rukman Hertadi, Indra Noviandri and Buchari Buchari</i>	805
16	Effects of particulate content on the bioaccumulation of Hg in farmed tilapia <i>Oreochromis mossambicus</i> using radiotracer <i>Heny Suseno, Djarot S. Wisnubroto, Sumi Hudiyono P. W. S. and Budiawan</i>	815
17	Monitoring of radionuclides in fishes, mussels and macroalage at Muria peninsula Central Java, Indonesia <i>Heru Umbara and Heny Suseno</i>	823
18	Demonstration of thermal spin crossover iron(II) compounds <i>Ira Mulyani, Djulia Onggo and Mimin Aminah</i>	829
19	The synthesis and characterization of 3-butyl-2-(2-butoxyphenyl)-4,5-diphenylimidazole as corrosion inhibitor toward carbon steel in 1% NaCl solution <i>Megawati Zunita, Buchari and Deana Wahyuningrum</i>	835
20	Electrocatalytic hydrogenation of soybean oil using hydrogen transfer agent <i>Nela Tanyela Berghuis, Deana Wahyuningrum, Muhammad Ali Zulfikar and Tatang Hernas Soerawidjaja</i>	848
21	Isolation of chlorophyll a from spinach and its modification using Fe ²⁺ in photostability study <i>Rachma Ditya, Sandiningtyas and Veinardi Suendo</i>	859
22	The synthesis of 2-(2-hydroxy-5-((4-nitrophenyl)diazenyl)-phenyl-4,5-di(2-pyridyl)imidazole as corrosion inhibitor towards carbon steel in 1% NaCl solution <i>Reni Kurniasih, Deana Wahyuningrum and Bunbun Bundjali</i>	874
23	The synthesis of conjugated imine derivative compounds as potential oled compound precursors <i>Rasy Putra Prajnamitra and Deana Wahyuningrum</i>	884
24	Microbiologically influenced corrosion (MIC) of AISI 1006 carbon steel by <i>Acidithiobacillus ferrooxidans</i> and <i>Desulfovibrio piger</i> <i>Wahyu Ardi Hartomo, Intan Nurul Rizki, Bambang Widyanto and Siti Khodijah Chaerun</i>	589
25	Photocatalytic degradation of surfactants anionic as detergent active compound using TiO ₂ /SiO ₂ catalysts <i>Agnes Maryani, Roekmi-ati K. Tjoktronegoro, Wawang Suratno and Siti Rochani</i>	906
26	Acoustic backscatter quantification of seabed using multibeam echosounder instrument <i>Zulham A. Harahap, Henry M. Manik and Sri Pujiyati</i>	911
	SECTION 7. MATHEMATICS	923
	1. Motion estimation of old animation video using multiresolution approach based on wavelet decomposition <i>Dwi Ratna Sulistyaningrum, Mochamad Hariadi and Mauridhi Hery Purnomo</i>	924



2	New calibration method for ensemble forecasts of non-normally distributed climate variables using meta-Gaussian distribution Heri Kuswanto	932
3	The exponential gompertz-like subdistribution model for competing risk survival time data Abdul Kudus	940
4	Edge magic total labeling of like SUN S_n Plus m S_n Plus m Chairul Imron and Suhud Wahyudi	949
5	The sensitivity of ensemble kalman filter to detect the disturbance of one dimensional heat transfer Erna Apriliani and Wiwit Sofiyanti Budiono	958
6	Two dimensional interpolation using tensor product of chebyshev systems Lukita Ambarwati and Hendra Gunawan	970
7	The study of model selection criteria in neural networks - multiscale autoregressive model based on design of experiments Afonsus J. Endharta, Brodjol Sutijo and Suhartono	983
8	Robust multivariate control charts to detect small changed outliers in the phase I for individual observations Ashkan Shabbak and Habshah Midi	995
	COG FLC implementation for input-output value calculation in DC motor braking control system B.S. Rahayu Purwanti, Feri Yusifar and Iwa Garniwa	1011
	Process capability analysis of delivering neonatal with normal weight (case study of neonatal weight data at a maternity clinic in Banjarmasin) Dewi Anggraini	1019
	Optimal control for seir rabies model between dogs and human with vaccination effect En Dwi Wiraningsih, Widodo, Lina Aryati, Syamsuddin Toaha and Suzanne Lenhart	1030
	Comparison approximation accuracy and time integral process between Simpson adaptive method and Romberg method Gerardus Polla	1044
	The mapping of water sources in Maluku through cluster analysis Henry Junus Wattimanela	1053
	Edge magic labeling of type (1,0,0) on 3-D graphs Latief M. A., Sugeng K. A. and Hariadi N.	1063
	G-TAR models with ARCH errors and the simulations Nelson Nainggolan, Budi Nurani Ruchjana, Sutawanir Darwis and Rustam E. Regar	1075
	Forecasting oil production using Kalman filter Nina Fitriyati, Sutawanir Darwis, A. Y. Gunawan and A. K. Permadi	1085
	Logit model to predict diabetes mellitus in employee Nurita Andayani and Moordiani	1095
	Detection of spatial-temporal autocorrelation using multivariate Moran and LISA method on Dengue Hemorrhagic Fever (DHF) incidence in East Java Suci Astutik, Bayu Rahayudi, Agustin Iskandar, Rahma Fitriani and Murtini	1103
	The eccentric digraph of a friendship graph Titi Atmojo Kusmayadi and M. Mulyono	1111
	Remarks on moment properties of generalized distributions Warsono	1123

SESSION 8. COMPUTER AND COMPUTATIONAL SCIENCE.....	1132
1 Ground station algorithm telemetry load test on rocket (RUM) LAPAN 2009 using the MS.VB 6.0 <i>Ageng Maulana, Rizki Eka Saputra and Yohannes Dewanto</i>	1133
2 Dominant feature extraction of EEG signal with sound stimulation using time-frequency wavelet analysis <i>Esmeralda C. Djamal and Suprijanto</i>	1140
3 Pseudo code algorithm for displaying the more digits of the Pell and Pell-Lucas numbers (<i>implementing in turbo pascal programming</i>) <i>La Zakaria</i>	1150
4 Safety analysis of hybrid systems with geometric programming <i>Salmah, Endra Joelianto, Indah Emilia W. and Noorma Yulia Megawati</i>	1158
5 Second level password generator <i>Tay Choo Chuan, Hamzah Sakidin, Nana Suryana Herman and Mohd Rizwan Baharon</i>	1169
6 Best basis selection for vocal fold diagnosis <i>Dhany Arifianto, Berry Noveriyanto, Hertiana B. D. Kusumaningrum and Sekartedjo</i>	1175
SESSION 9. EARTH AND SPACE SCIENCES.....	1186
Identification of the intrinsic spectrum of star using line spread function of spectrograph at Bosscha observatory, Institut Teknologi Bandung <i>Andreas Liudi Mulyo, Hakim L. Malasan and Sekartedjo</i>	1187
On the relation of type II solar radio burst with x-ray flares and Coronal Mass Ejection (CME) during year 2004 to 2009 <i>Aprilia Setiyarti Rahmani and Dhani Herdiwijaya</i>	1201
Modified accretion disk cellular automaton model producing lognormal flux distribution <i>Chatief Kunjaya, Mahasena Putra, Kiki Vierdayanti and Stefani Herlie</i>	1207
Developing telescope baffle for increasing contrast of the very young lunar crescent visibility <i>Dhani Herdiwijaya, Mitra Djamal, Hendra Gunawan, Zanzabila A. Mexsida, Denny Mandey and Rio N. Wijaya</i>	1214
The use of small radio telescope to infer the galactic rotation curve and spiral arms <i>Dyas Utomo, Samuel R. Damanik and Taufiq Hidayat</i>	1221
Photoionization models of planetary nebula, NGC 3918 <i>Fathonah D. Rahayu and Hakim L. Malasan</i>	1234
peculiar behavior of GRS 1915+105 at near-Eddington luminosity <i>Kiki Vierdayanti, Shin Mineshige and Yoshihiro Ueda</i>	1243
Design and analysis of simple solar telescope and real time image acquisition <i>Oghinta, Dhani Herdiwijaya and Warsito</i>	1247
Instrumental magnitude and color index of field stars in the region of M6 (NGC 6405) and M7 (NGC 6475) open clusters <i>Puri Siti Rahma, Mochamad Irfan and Judhistira Aria Utama</i>	1254
Analysis of climate change and CO ₂ Variability in Semarang <i>Rahmat Gernowo, Kusworo Adi and Zaenal Arifin</i>	1258
1. Evaluation of water vapor over Indonesia to estimate radio millimeter transparency for astronomical site selection <i>Taufiq Hidayat</i>	1264



Hak Cipta Dilindungi Undang-Undang

1. Dilarang mengutip sebagian atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber:

- a. Pengutipan hanya untuk kepentingan pendidikan, penelitian, penulisan karya ilmiah, penyusunan laporan, penulisan kritik atau tinjauan suatu masalah.
- b. Pengutipan tidak merugikan kepentingan yang wajar IPB.

2. Dilarang mengumumkan dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun tanpa izin IPB.

12 Characteristic measurement of the 2.3 m Bosscha radio telescope
R. Abudan, L. Mayangsari, R. D. Hapsari, Y. Ghea, A. Dzikra, P. Husnindriani, R. W. Wibowo, G. P. Putri, D. Utomo and T. Hidayat 1276

Addendum

13 Interpretation of rainfall data using analysis factor method
Falahah and S. Suprpto 1288

MEASURING ECHO STRENGTH OF FISH AND SEA BOTTOM USING UNDERWATER ACOUSTIC INSTRUMENT

Henry M. Manik

Department of Marine Science and Technology Bogor Agricultural University
Kampus IPB Darmaga Bogor 16680 INDONESIA

Abstract. Underwater acoustic technology is indispensable method to receive underwater information. For this purpose, we used an underwater acoustic instrument with operating frequency of 200 kHz to detect and measure the echo strength of fish and sea bottom. The value of echo strength is important to be obtained not only in estimating fish stock, but also in designing and constructing of sonar instrument. By this research, the application of underwater acoustic technology is obtained to detect and quantify fish and sea bottom. Results showed the echo strength of fish depends on the orientation of fish to transducer. The echo strength of sand bottom is higher (8 dB) than fish target.

Keywords: Echo Strength, Underwater Acoustic Instrument

1 Introduction

Underwater acoustic research of fishery and seabed resources using scientific sonar system are used worldwide. To obtain the fish distribution density or volume backscattering strength (SV), it is important to quantify the target strength (TS) of fish.

However, the acoustic research has several problems. There is no definitive method for fish and sea bottom classification. Besides, the difficulties arise in quantifying TS to SV. These problems must be solved to improve the reliability of the underwater acoustic research.

Some work on comparison of different systems and frequencies has been already done: Rudstam, *et al* [1] compared the performance of single and split beam acoustic instruments. However up to now no systematic work on comparison of acquisition and analysis parameter settings within a single system have been performed. In situ target strength (TS) is the optimal quantity to scale echo integration values to fish density [2], so the precise knowledge of TS distributions is the primary importance for the proper fish biomass estimation. The relationships between target strength and fish size are not well enough known to permit accurate sizing and reliable identification to be done as routine work at sea.

Hak Cipta Dilindungi Undang-Undang

1. Dilarang mengutip sebagian atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber:
 - a. Pengutipan hanya untuk kepentingan pendidikan, penelitian, penulisan karya ilmiah, penyusunan laporan, penulisan kritik atau tinjauan suatu masalah.
 - b. Pengutipan tidak merugikan kepentingan yang wajar IPB.
2. Dilarang mengumumikan dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun tanpa izin IPB.



Measuring Echo Strength Of Fish And Sea Bottom Using Underwater Acoustic Instrument

The aim of this paper was to simultaneously quantification of fish and seabed using underwater acoustic instrument.

2 Methodology

Data Acquisition

Underwater acoustic transmitting and receiving systems were constructed in this research (Fig. 1). In the transmitting system, the signal from a signal generator was amplified by a power amplifier and the signal was sent to the transducer. In the receiving system, the reflected and backscattered wave were sent by the receive transducer. The output signals were observed, measured, and transformed into digital data by Digital Signal Processing (DSP), and the acoustic data were transferred to a personal computer via a developed interface.

The transmit and receive transducers were designed as a monostatic system. The operating frequency was 200 kHz with the beam width of the transducer is 8°. The acoustic instrument was calibrated with standard copper sphere [3]. Calibration of standard target for this frequency showed no change from the manufacturer calibration and theoretical value.

Field acoustic data were collected in around Seribu Island, Indonesia. Global Positioning System (GPS) was used for the positioning of the acoustic transect, bottom and fish sampling. Underwater acoustic data, water depth, water temperature and GPS data were stored in a computer and later processed by the Matlab software.

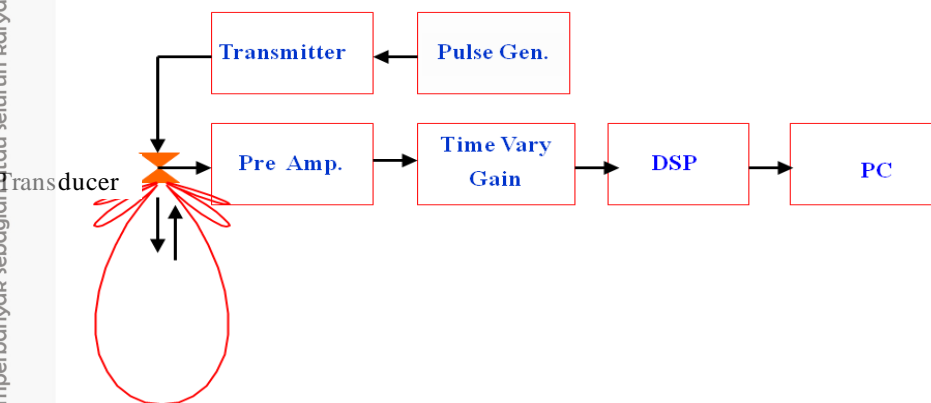


Figure 1. Designing Underwater Acoustic Instrument

Hak Cipta Dilindungi Undang-Undang

1. Dilarang mengutip sebagian atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber:
 - a. Pengutipan hanya untuk kepentingan pendidikan, penelitian, penulisan karya ilmiah, penyusunan laporan, penulisan kritik atau tinjauan suatu masalah.
 - b. Pengutipan tidak merugikan kepentingan yang wajar IPB.
2. Dilarang mengumumkannya dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun tanpa izin IPB.

1. Dilarang mengutip sebagian atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber:
 - a. Pengutipan hanya untuk kepentingan pendidikan, penelitian, penulisan karya ilmiah, penyusunan laporan, penulisan kritik atau tinjauan suatu masalah.
 - b. Pengutipan tidak merugikan kepentingan yang wajar IPB.
2. Dilarang mengumumkan dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun tanpa izin IPB.

Henry M. Manik

Data Processing

Underwater acoustic data were processed and analyzed using MATLAB software. This program uses the sonar equations algorithm to quantify a target strength distribution from the measured distribution of peak voltage response from single fish and seabed echoes. All analysis is performed using data collected with 40 log R TVG for single target and 20 log R TVG for multiple target, where R is the range between transducer face to the target and TVG is Time Varied Gain. TVG was designed to compensate the acoustic wave propagation losses in sea water [3].

Data Analysis

The echo strength or target strength (TS) of fish or sea bottom is defined as

$$TS \text{ (dB)} = 10 \log (I_r / I_i) \quad (1)$$

where I_r is reflected intensity from the target, I_i is incident intensity to the target.

The developed algorithm for Target Strength (TS) or Bottom Backscattering Strength (SS) measurement as follows :

$$TS \text{ (dB)} = SS \text{ (dB)} = 10 \log (EA / DN) \quad (2)$$

where EA is echo amplitude and DN is 8 bit digital number ranges from 0 to 255.

The Echo Strength (ES) or Echo Level (EL) is obtained using sonar equation below

$$ES = EL = SL - 2 TL + TS \quad (3)$$

where SL is Source Level, TL is Transmission Loss and TS is Target Strength.

3 Results and Discussion

Underwater Acoustic Calibration

Calibration is fundamental work for underwater acoustic instrument. The sphere was installed at the beam axis position and in far field range. From the measurement, the sphere was detected at 1.4 m below the transducer (Fig.2). The target strength of sphere is -36.0 dB. This value is similar with the TS obtained using the theoretical value.

Hak Cipta Dilindungi Undang-Undang

1. Dilarang mengutip sebagian atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber:
 - a. Pengutipan hanya untuk kepentingan pendidikan, penelitian, penulisan karya ilmiah, penyusunan laporan, penulisan kritik atau tinjauan suatu masalah.
 - b. Pengutipan tidak merugikan kepentingan yang wajar IPB.
2. Dilarang mengumumkannya dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun tanpa izin IPB.

Measuring Echo Strength Of Fish And Sea Bottom Using Underwater Acoustic Instrument

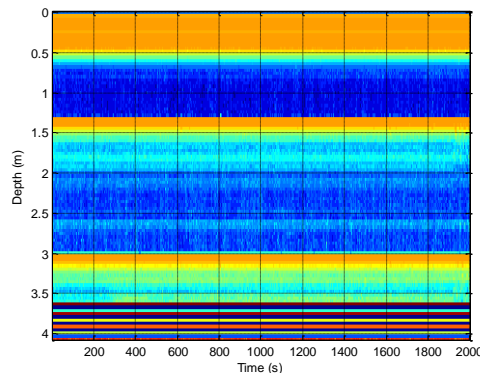


Figure 2. Sphere calibration detected at 1.4 m

Target Strength distributions

Target strength distribution obtained with the developed method using acoustic transmitting and receiving instrument was shown in Fig. 3. Average target strengths (TS) calculated with acoustic method on backscattering cross section unit. All averaging were done in the linear domain and back transformed to dB units. Figure 3 shows the Target Strength varies on fish orientation. The highest target strength is near 0° . This is caused in this position (0°) the response of acoustic energy is maximum to reflect the acoustic energy from the fish. This result is correlated to the maximum response axis of the transducer [4],[5].

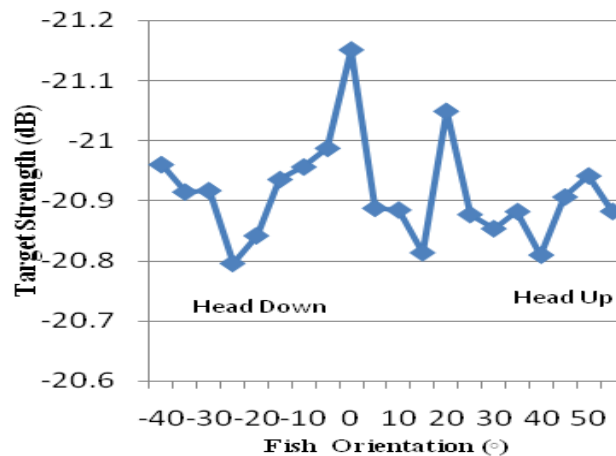


Figure 3. Target strength against fish orientation.

Figure 4 shows the acoustic reflection from seabed. The depth of seabed was measured around 10 to 16 meter. The echo strength of seabed (or bottom backscattering strength, SS) is around -8.0 dB shown in color bar scale.

Hak Cipta Dilindungi Undang-Undang

1. Dilarang mengutip sebagian atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber:
 - a. Pengutipan hanya untuk kepentingan pendidikan, penelitian, penulisan karya ilmiah, penyusunan laporan, penulisan kritik atau tinjauan suatu masalah.
 - b. Pengutipan tidak merugikan kepentingan yang wajar IPB.
2. Dilarang mengumumkan dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun tanpa izin IPB.

Henry M. Manik

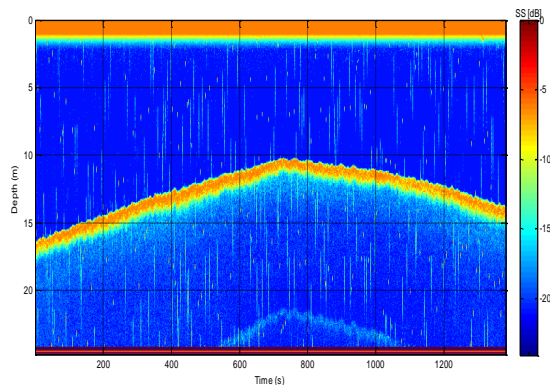


Figure 4. Underwater images obtained by underwater acoustic system.

Medwin and Clay [3] presented their result that sand bottom with echo strength was around -12.6 to -6.0 dB. The echo strength of fish was around -22.5 to -20.5 dB (Fig. 5). This result is agreed with the result of the previous measurements using sonar [5],[6]. Figure 6 shows the echo strength (SS) of sand bottom varies on time ranged between -12.5 to -13.0 dB. This is agreed to the former study the echo strength of sand bottom is around -12.7 dB using 200 kHz frequency of echo sounder [3].

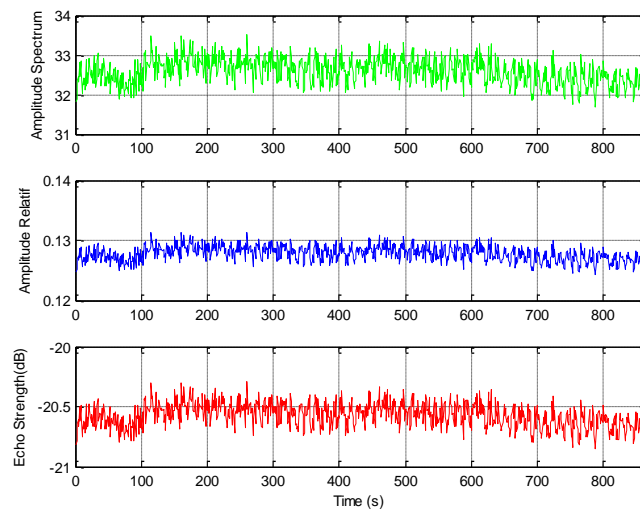


Figure 5. Echo strength of fish.



Hak Cipta Dilindungi Undang-Undang

1. Dilarang mengutip sebagian atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber:
 - a. Pengutipan hanya untuk kepentingan pendidikan, penelitian, penulisan karya ilmiah, penyusunan laporan, penulisan kritik atau tinjauan suatu masalah.
 - b. Pengutipan tidak merugikan kepentingan yang wajar IPB.
2. Dilarang mengumumkan dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun tanpa izin IPB.

Measuring Echo Strength Of Fish And Sea Bottom Using Underwater Acoustic Instrument

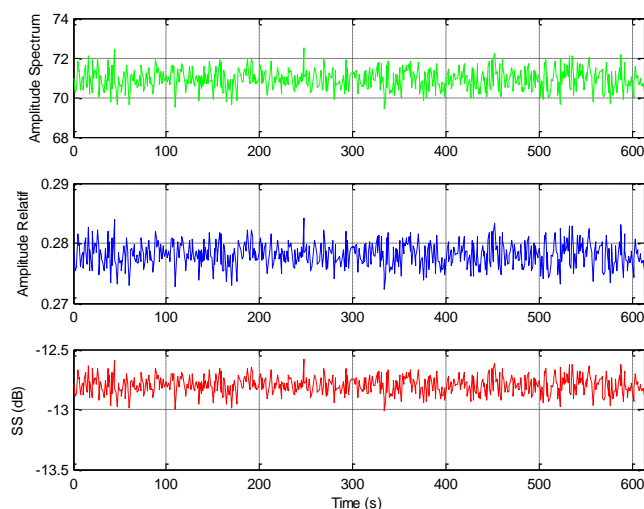


Figure 6. The echo strength of sand bottom.

4 Conclusion

We conclude our study as follows:

1. Underwater acoustic technology is a reliable tool to detect, quantify and identify sonar target such as fish and sea bottom.
2. The echo strength of sand bottom is higher (8 dB) than fish echo.

The following topics are suggested for future work :

1. A research aimed at improving the signal to noise ratio to gain better quantitative information.
2. A research of echo strength spectra for underwater target identification and quantification.

Acknowledgments

This research was supported by the Directorate General of Higher Education (Ditjen Dikti DP2M) for National Strategic Research Grant FY 2010. We are grateful to Asep Ma'mun for data collection.

References

- [1] L.G Rudstam, S. Hanson, T. Lindem, D.W. Einhouse (1999), Comparison of target strength distributions and fish densities obtained with split and single beam echo sounders, *Fisheries Research* **42**, pp. 207-214.

**Hak Cipta Dilindungi Undang-Undang**

1. Dilarang mengutip sebagian atau seluruh karya tulis ini tanpa mencantumkan dan menyebutkan sumber:
 - a. Pengutipan hanya untuk kepentingan pendidikan, penelitian, penulisan karya ilmiah, penyusunan laporan, penulisan kritik atau tinjauan suatu masalah.
 - b. Pengutipan tidak merugikan kepentingan yang wajar IPB.
2. Dilarang mengumumkan dan memperbanyak sebagian atau seluruh karya tulis ini dalam bentuk apapun tanpa izin IPB.

Henry M. Manik

- [2] M. Furusawa (1991), Designing quantitative echo sounders, , *J. Acoust. Soc. Am*, **102**, pp. 26-36.
- [3] H. Medwin, and C.S. Clay, *Fundamental of Acoustical Oceanography*. Academic Press, San Diego, 712 p.
- [4] K. Sawada, M. Furusawa, N.J. Williamson (1993). Conditions for precise measurement of fish target strength in situ, *Mar. Acoust. Soc. Jpn*, **20**, 15-21.
- [5] C.S. Clay (1983), Deconvolution of the fish scattering from the echo PDF for a single transducer. *J. Acoust. Soc. Am*, **73**, 1989-1994.
- [6] K.G. Foote (1980), Averaging of fish target strength functions, *J. Acoust. Soc. Am*, **67**, 504-515.

Details of author

HENRY M. MANIK
Department of Marine Science and Technology
Bogor Agricultural University
Kampus IPB Darmaga
Bogor 16680 INDONESIA
E-mail : henrymanik@ipb.ac.id