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ISH -- NEWS

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THE INDIAN SOCIETY FOR HYDRAULICS

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WAVE ENERGY AS ONE OF THE ALTERNATIVE SOURCE OF GREEN ENERGY

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Introduction: The energy utilization is one indicator of economic progress of a society. Indian economy is growing fast hence the demand for energy is and will be ever increasing. While generating electricity from fossil fuel, pollution is a problem and these resources are depleting as well. The possible solution is to harness a renewable and green energy resource for generating energy in a usable form.

Besides the wind, solar and hydro power, wave power is one of the most effective renewable energy resource. In this context, the possibility of producing energy from the waves in the sea is being explored. Wave energy has the potential to contribute significant amount of renewable energy to the world's energy demands. Waves are generated from the impact of winds over a large area and for long duration, as a result, energy is concentrated in the form of waves. Waves have the advantages of easy and more reliable predictability. Wave energy extraction requires less land area compared to the wind energy. These are the favourable aspects of wave energy extraction. However there are difficulties in wave energy extraction like identification of sites and the low efficiency of wave energy conversion units. Let us understand the advances made in assessing the wave energy potential, the progress in improving the feasibility of wave energy extraction. The present estimate of world wave energy potential is about 3.7 TW. [1] It has been found that largest power levels occur off the western coast of the continents due to the coriolis force. There is seasonality in the occurrence of wave energy in the near shore more so in the northern hemisphere.

In Europe and Australia the wave energy potential is high and some wave energy conversion plants are installed. Islay LIMPET in United Kingdom was the first commercial wave power installation. A wave hub has been constructed off the coast of Cornwell, UK. In Portugal a wave farm consisting of an array of wave energy converter is producing 2.25 MW electricity. Australia has taken a lead by installing a few wave energy farms on the southern coast. Commercially viable wave energy conversion will be possible in near future. [2]

Initiatives in India: In India the total wave energy potential is estimated to be 41 GW. [3] The wave energy potential between 5kW/m to 15kW/m exists on east and west coastline. However on the western side there are energy rich sectors in Kerala, Karnataka, Goa and Maharashtra coast. Maximum wave power can be extracted at the southern tip of India near Kanyakumari and some parts of Lakshadweep and Andaman Islands. [4,5]

A wave energy converter was installed at Vizingam near Thiruvanantpuram. The plant was

technically successful but was not found to be practically feasible. With the advent of new technology in the construction of the wave energy conversion units like cassions the efficiency can be improved two fold.

Experiments to power desalination plant using the wave energy converters were conducted recently. National Institute of Ocean Technology (NIOT) worked in off grid plants. Dr. Purnima Jalihal and coworkers have deployed wave energy cassion near Chennai and Andaman Islands which will power a desalination plant. The fresh water is used by the coast guards. A wave-powered navigational buoy, developed by NIOT to guide ships in and out of ports is installed in Chennai in 2017.

At IIT Madras Prof. Sundar, Prof. Sanasiraj and their students are conducting studies to improve the efficiency of oscillating column wave converter. Also the evolution of efficient wave energy farms is under progress.

Numerical Modelling to assess of wave energy potential:

To install a wave energy conversion unit the correct assessment of the wave energy potential and the temporal distribution of available energy is essential. The third generation spectral wave models like WAM, SWAN and MIKE 21 SW are used to estimate wave energy potential along the coast spatially and temporally. First time in India a successful attempt to assess wave energy potential along the south Maharashtra coast using a numerical model was carried out by Central Water and Power Research Station [6] Wave energy potential along Ratnagiri coast was analysed using a third generation spectral wave model, MIKE21 SW and from the measured waves for the year of 2014. The study area considered extends from Kumta in Karnataka to Murud in Maharashtra.

Unstructured flexible triangular mesh is used to resolve the region of interest with fine resolution with optimum number of elements. The mesh file generated in the present study has 13702 nodes and 26544 elements. The area of the mesh near Ratnagiri, is shown in the figure 1. Wind is the basic input parameter for wave simulation. Successful wave hind cast depends on accurate wind data. The wind and wave data at offshore and near shore collected by Indian National Centre for Ocean Information Services (INCOIS) was used. The time series of the wind data measured at (Long

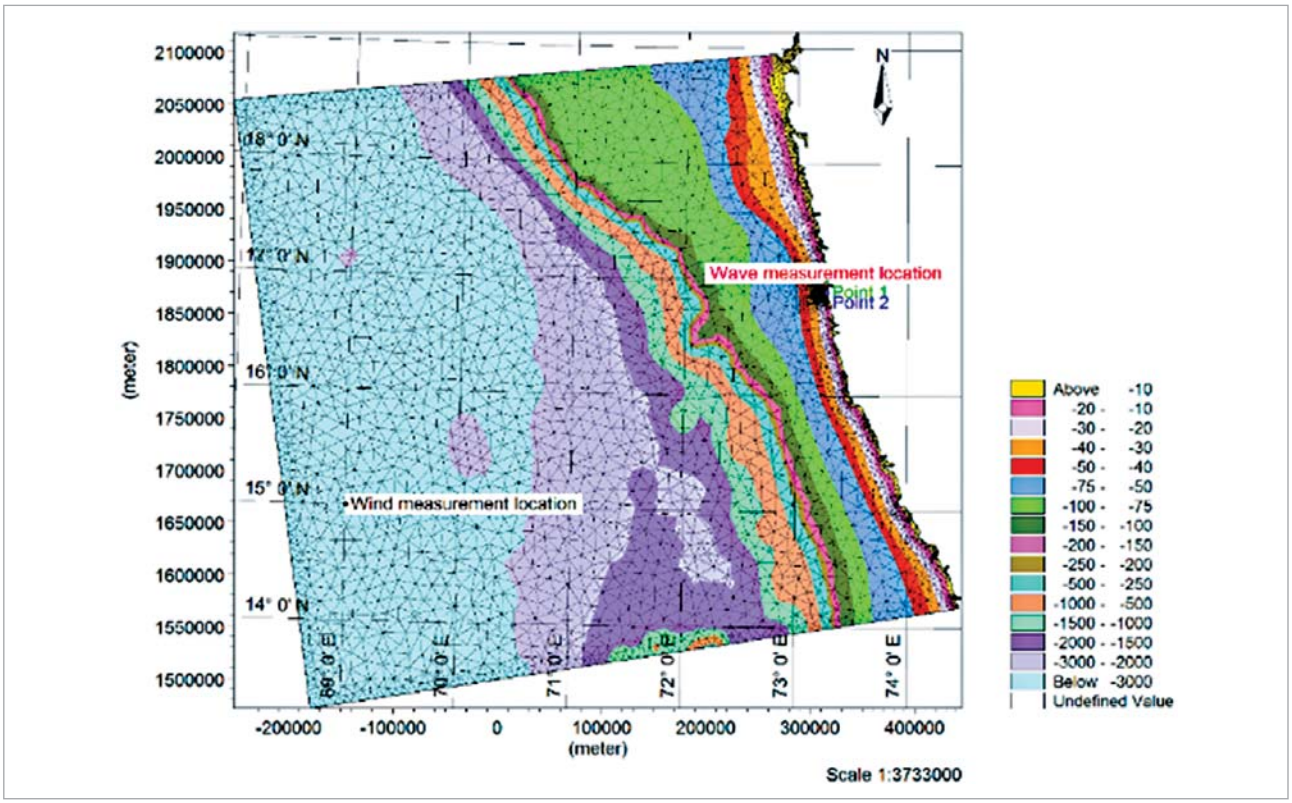

Fig. 1: Bathymetry and mesh near Ratnagiri.

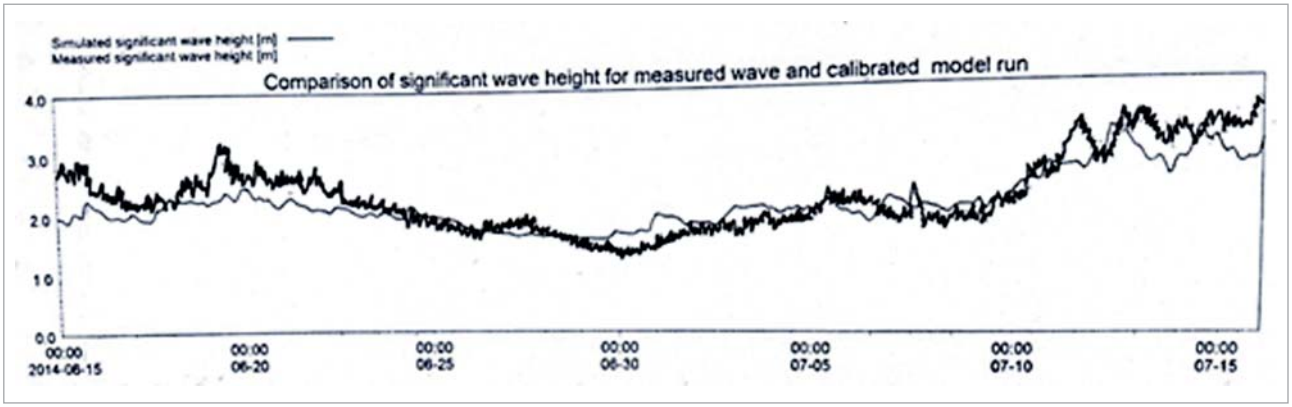

Fig. 2: Comparison of simulated and measured wave height time series from 15th June to 15th July 2014

69.004 show superscript 0 for degree) is the input. The model was calibrated against measured wave data at the 15 m depth near Ratnagiri (Long. 73.263^0, Lat. 16.977^0).

The wave height time series at the measurement location matched very well with the measured wave heights with the correlation coefficient of 0.85. The comparison is shown in figure 2. The wave energy map is prepared for hourly time periods. A typical plot is given instead of below in figure 3. From the spatial distribution of average wave power potential three more locations Mirya, Ratnagiri, Ranpar were identified where availability of wave energy is comparable to the energy at the location suggested by Indian Renewable Energy Development Agency (IREDA).

The wave power is concentrated in the south west monsoon. Total wave power available in annual and South West monsoon is given in Table 1 which depicts the seasonality of the wave power.

The monthly variation of average power potential at the selected points at 1. Mirya, 2. Ratnagiri 3. Pawas which is also measurement location 4. Ranpar shown in figure 4. Similar simulations for South West monsoon period for 2013, 2015 and 2017 were carried out in CW&PRS using the wind data of INCOIS in deep sea. The

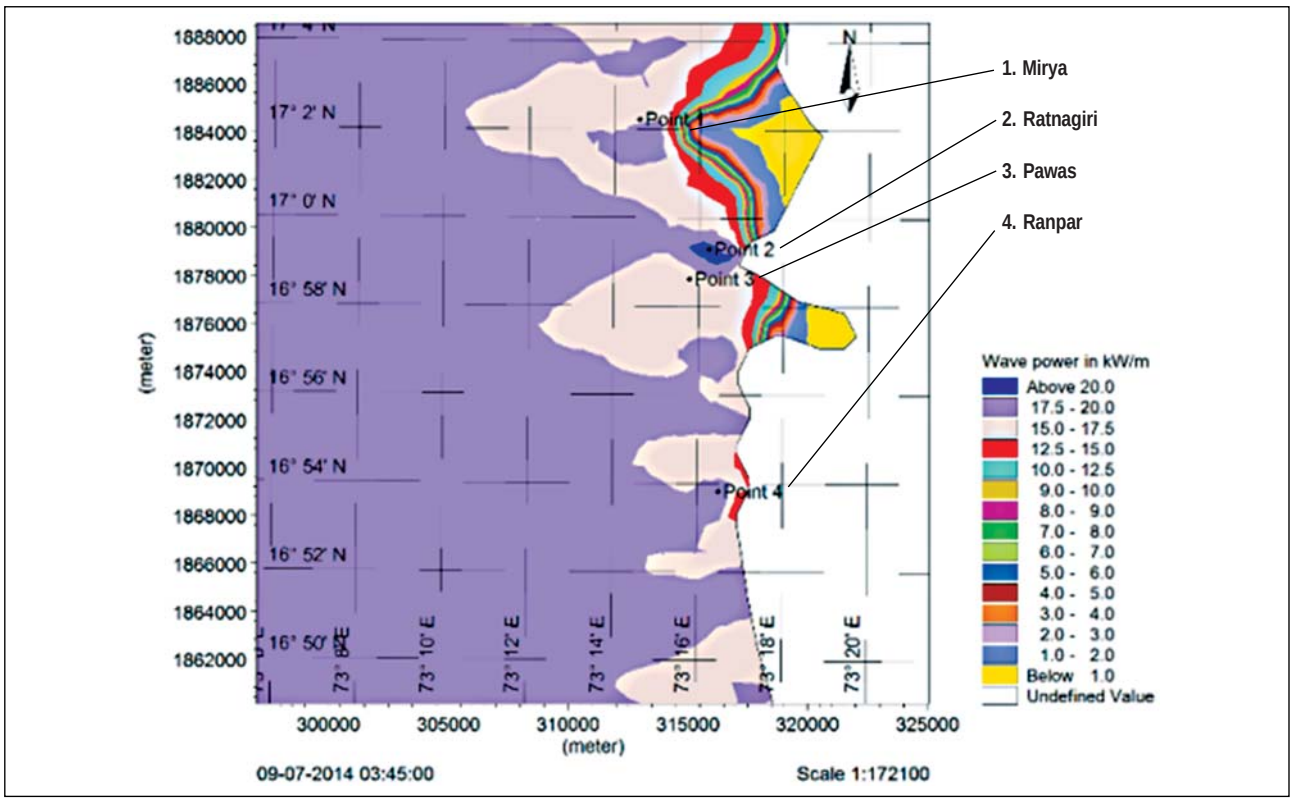

Fig. 3: Typical Wave Energy Potential Map near Ratnagiri coast.

Table 1: Wave Power during Annual and South West Monsoon Period near Ratnagiri.

Location	Total Wave Power in the year (kW/m)	Total Wave Power South West Monsoon (kW/m)	Percentage of Wave Power occurred in South West Monsoon
Measured	84.006	73.406	87.38%
Mirya	71.498	62.93	88.01%
Ratnagiri	82.123	72.291	88.03%
Pawas	70.532	62.085	88.02%
Ranpar	76.503	66.917	87.47%

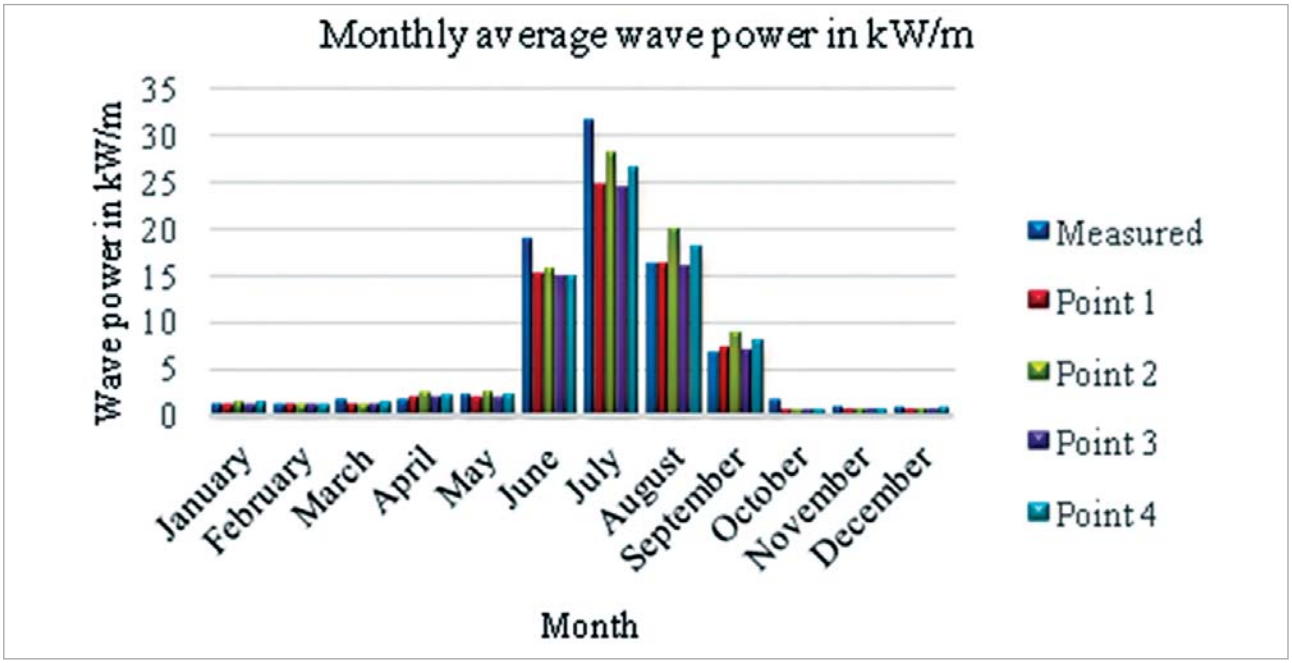

Fig. 4: Monthly average Power at the selected locations in 2014.

models were calibrated against the wave data at 15m depth. The average wave power potential values for the years 2013, 2014 and 2015 are tabulated.

The annual average wave energy is in the range of 5.9 kW/m to 7kW/m and the average wave energy is between 15 to 22kW/m in the South West monsoon. It is seen that the results for the three years are consistent also they match with the results from the measured wave parameters. The wave energy potential map is prepared which has provided the spatial variability as well. The studies for years 2013,2015 and 2017 are described in the M. Tech. thesis of Shri. Rupesh Kumar, Central University of Jharkhand. Thus the comprehensive numerical model study is successful. This method holds lot of promise to estimate the wave energy potential on the coasts of India.

The wave energy conversion units or wave farms with an efficient arrangement can be considered as offshore breakwaters dissipating wave energy reaching the shore. The efficiency of the WECs and

Table 2: Average Wave Energy Potential (kW/m) for the Monsoon season

Locations	2013	2014	2015	Location	2013	2014	2015
Measured	17.99	18.35	15.08	Pawas	17.97	18.07	13.92
Mirya	19.25	22.73	15.73	Ranpar	16.88	16.73	14.12
Ratnagiri	15.37	21.64	15.52				

the suitable arrangement of wave farms can be studied using numerical models. Such studies have been initiated in CW&PRS. The wave farms or WEC units absorb the wave energy reaching the shore this will reduce the erosion of the shoreline behind them. Thus deploying WEC at the erosion prone shores can combine the benefits of harnessing wave energy and shore protection. This can be used to protect erosion prone beaches. Such installations would be economically better feasible.

In India, the research in multifold directions is in progress to make wave energy conversion feasible. A comprehensive plan combining the ongoing research in these research centers will provide a pathway for harnessing the wave energy.

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FORTHCOMING CONFERENCES / SEMINARS

Sr. No.	Name of Conference	Date	Venue and contact details
1	6th Indian National Conference on Ocean Engineering (INCHOE-2018)	26-28 Sept, 2018	CWPRS, Pune www.ish.net.in
2	Hydro 2018 International	19-21 Dec, 2018	NIT Patna, hydro2018international@gmail.com
3	4th Arabian Coast Congress	01- 30 Jan, 2019	Songdo,Incheon,Korea http://ichd-home.com/ICHD2018.html
4	International colloquium on "Droughts and water scarcity"	09 January 2019	France, Daniel Loudière <daniel.loudiere@free.fr>
5	HydroSenSoft - 2nd International Symposium and Exhibition on Hydro-environment Sensors and Software	26 Feb - 01 Mar, 2019	IFEMA Feria de Madrid, Spain office@iahr.org
6	10th International Symposium on Managed Aquifer Recharge (ISMAR10)	20- 24 May, 2019	Madrid, Spain http://ismar10.net
7	XXXVIII International School of Hydraulics	21- 23 May, 2019	£¹ck, Poland
8	7th International Conference on Debris Flow Hazards Mitigation	10- 13 June, 2019	Golden, Colorado USA, http://alertgeomaterials.eu/2016/12/7th-international-conference-on-debris-flow-hazards-mitigation/
9	38th IAHR World Congress	01- 06 Sept, 2019	Panama City, Panama http://iahrworldcongress.org/

ANNOUNCEMENTS FOR ANNUAL ISH AWARDS 2018

Nomination for S.N.Gupta Memorial Lecture

Prof. Vijaykumar Gupta of Colorado University, Boulder (USA) has donated a sum of Rs. 2.5 lakhs towards hosting a memorial lecture in the field of Hydraulics and Hydrological Engineering in the name of his father, late Shri S.N.Gupta, former Secretary, CBIP and Director of U.P. Irrigation Research Institute, Roorkee. The lecture series was started from the year 2003. Nominations are invited for delivering the lecture in this series. The nomination letter should contain information about his expertise of the topic on which he will speak. The lecture would be held during International Conference HYDRO 2018 at NIT, Patna. The last date for receiving nominations is 30th Sept, 2018.

Nomination for ISH R J Garde Life Time Achievement Award

The Indian Society for Hydraulics has instituted Life-Time Achievement Award for Hydraulic Engineer / Scientist from India who has contributed significantly in the field of hydraulic engineering and water resources. The award consists of Rs. 10,000/- and a citation. Nominations/proposals are invited from the ISH Life members. Self nominations are generally discouraged. The last date for receiving nominations is 30th Sept, 2018.

Nomination for Prof. R J Garde Young Researcher Award

ISH Constituted this Award in memory of Late Prof.R.J.Garde with the deposit offered by his family and his students to promote the young researchers in the field of Hydraulics and Hydrology. It shall be awarded in the form of a cash prize of Rs. 10000/-, a memento and a certificate. This year the award shall be presented during the International HYDRO Conference 2018 of the ISH to be held at NIT, Patna. The nominations should be submitted to the ISH Secretariat for further processing. The award shall be given to young engineers, scientists and researchers who have not completed 45 years of age. The award will be open to Indian Nationals only. The award shall be given mainly for the work done in India in the area of Water Resources Engineering in general and Hydraulic Engineering in particular. ONE complete nomination package should be submitted to the ISH in the form of soft copy by 30th Sept, 2018. The following information must be included in the nomination.

1. Name of the Candidate with complete postal address and mobile number, E-mail, date of birth, age, on last date of nomination
2. Letter of nomination including a statement of not more than 500 words of the Significant Contributions and / or national/international impact and future potential.
3. Two letters of recommendation
4. Chronology of education
5. Chronology of jobs held
6. Complete list of referred publications in journals and conferences (Not more than five (5) significant recent publications are to be attached)
7. Certificate of age should also be attached
8. Any other relevant information

Announcement for International Conference HYDRO 2018

National Institute of Technology (NIT), Patna, and The Indian Society for Hydraulics (ISH) are jointly hosting 'International Conference HYDRO 2018" on Hydraulics, Water Resources and Coastal Engineering, December 19 - 21, 2018 at NIT, Patna.

The "HYDRO 2018 International Conference" represents a link in the chain of such "Hydro" conference organised annually in India over a period of last two decades under the auspices of The Indian Society for Hydraulics. The conference would provide a forum for presentation and exchange of knowledge and research experience gained in the field of hydraulics, water resources, and coastal engineering by scientists, academicians, practicing engineers and consultants.

Extended versions of the selected papers presented in the conference may be published in ISH Journal of Hydraulic Engineering, Taylor & Francis, UK.

Following e-mail and web pages provide more details of the conference.

e-mail: hydro2018international@gmail.com

web: www.nitp.ac.in

Nomination for Prof.U.C.Kothyari Best M Tech & Ph D thesis Award

ISH Constituted this Award from the year 2013 to encourage the young Indian students of recognized educational institutions in the area of Water Resources Engineering in general and Hydraulic Engineering in particular (Water Resources, Environment, Coastal Engineering). The Dissertation/Thesis must have been successfully defended during September 30, 2016 to August 31, 2018. The award will be in the form of a cash prize of Rs. 5,000/- for the M Tech dissertation and Rs. 10,000/- for the Ph D thesis and a certificate. This year the award shall be presented during the International HYDRO Conference 2018 of the ISH to be held at National Institute of Technology (NIT), Patna. The nomination should be submitted through a recognized educational institution to the ISH Secretariat for further processing. The award shall be given to young engineering, scientific or research students of Indian nationals. The last date for receiving nomination is 30th Sept, 2018. The nomination should be sent as an email attachment to the Secretary, ISH at the following Email address: **ish_office@rediffmail.com**, hard copies are not necessary.
It should contain the following:

(i) A cover letter that should include one-paragraph CV of the candidate and supervisor,
(ii) pdf file of the dissertation/thesis not exceeding 10 MB in size,
(iii) Any other recognition received for the dissertation/thesis, Journal papers published based on the work, transfer of technology, if happened,
(iv) Names and affiliations of the referees, who acted as examiners,
(v) Copies of the examiners' reports, if possible – not mandatory.

ISH assures full confidentiality/copyright of the dissertation/thesis, which will be used only for the purpose of deciding the awards.

Announcement for National Conference INCHOE 2018

Central Water & Power Research Station (CWPRS), Pune, INDIA, under the aegis of The Indian Society for Hydraulics (ISH) is organizing Indian National Conference on Coastal, Harbour and Ocean Engineering (INCHOE 2018) during September 26-28, 2018 at CWPRS, Pune. The conference is the 6th in the series of Indian Conference on Coastal, Harbour and Ocean Engineering. A Key feature of the INCHOE 2018 will be a multi disciplinary conference with a concurrently running exhibition enriching the theme and covering entire gamut of technologies and facilities available for Coastal, Harbour and Ocean Engineering.

The rationale of the conference is to bring together engineers/ scientists working in design, planning, construction maintenance and research aspects of Coastal Engineering and Port Development to interact and exchange their experiences through paper and invited lectures. The conference would be conducted in parallel sessions. Any topics not listed below but of relevance to the objectives of INCHOE 2018 would also be considered. The following are the themes covered in this conference:

PORT & HARBOUR ENGINEERING

Planning, design, construction, management aspects of existing / proposed ports, terminals, harbours, shipyards, marinas, structures, dredging, siltation, and related issues, case studies

OCEAN ENGINEERING

Offshore structures - materials, construction, management, fatigue, corrosion, maintenance; Wave dynamics, Statics & dynamics of offshore structures and vehicles, Marine instrumentation, fluid-structure-soil interactions, Marine geotechnical engineering

COASTAL DYNAMICS

Coastal hydrodynamics, wave transformation, tides, surges, extreme events, harbour resonance, sediment transport, beach and nearshore dynamics, shoreline changes, coastal defense works, coastal structures, coastal hydrology, Applications of Remote sensing & GIS, Soft computing techniques

COASTAL ENVIRONMENT & RESOURCES

Coastal pollution, mineral deposits, submarine ground water discharges, Marine outfalls, estuarine hydraulics, Marine renewable energy

DISASTER, RISK, DEVELOPMENT & MANAGEMENT

Tsunamis, sea level rise, risk assessment, vulnerability indices, coastal zone management, information systems, sustainability, emerging trends, data management, legal policies, advisories.

Following e-mail and web pages provide more details of the conference.
e-mail: inchoe2018_paper@ish.net.in, inchoe2018_os@ish.net.in
web: www.ish.net.in

THE INDIAN SOCIETY FOR HYDRAULICS

(FIXED DEPOSIT AND SAVING BANK COMPARATIVE BALANCE STATEMENT)

As on 15-Mar-2018

Canara Bank(S.B A/c No. 25801010000822) Customer ID 30433962 — Rs. 60875

Sr. No.	Name of Bank	Date of Deposit	Date of Maturity	Amount Rs.	Rate of Interest
1	Canara Bank, Khadakwasla, P.O. R.S., Pune - 411024 (10 FDs)	26-Aug-15	26-Aug-18	800000	8.00%
		09-May-16	08-May-19	1154490	7.55%
		02-Jul-16	02-Jul-19	640523	7.55%
		07-Mar-17	07-Mar-22	307723	6.90%
		07-Mar-17	07-Mar-22	228914	6.90%
		09-Mar-17	09-Mar-20	300000	6.90%
		09-Mar-17	09-Mar-20	400000	6.90%
		09-Mar-17	09-Mar-20	700000	6.90%
		30-May-17	30-May-20	400000	6.70%
		27-Nov-17	27-Nov-18	100000	6.95%
	Total FD amount with Canara Bank		Rs.	5031650	
	Grand Total		Rs.	5092525	

(Rupees Fifty lakh ninety two thousand & five hundred and twenty five only)

As on 15-July-2018

Canara Bank(S.B A/c No. 25801010000822) Customer ID 30433962 — Rs. 213901

Sr. No.	Name of Bank	Date of Deposit	Date of Maturity	Amount Rs.	Rate of Interest
1	Canara Bank, Khadakwasla, P.O. R.S., Pune - 411024 (10 FDs)	26-Aug-15	26-Aug-18	800000	8.00%
		09-May-16	08-May-19	1154490	7.55%
		02-Jul-16	02-Jul-19	640523	7.55%
		07-Mar-17	07-Mar-22	307723	6.90%
		07-Mar-17	07-Mar-22	228914	6.90%
		09-Mar-17	09-Mar-20	300000	6.90%
		09-Mar-17	09-Mar-20	400000	6.90%
		09-Mar-17	09-Mar-20	700000	6.90%
		30-May-17	30-May-20	400000	6.70%
		27-Nov-17	27-Nov-18	100000	6.50%
	Total FD amount with Canara Bank		Rs.	5031650	
	Grand Total		Rs.	5245551	

(Rupees Fifty two lakh forty five thousand & five hundred and fifty one only)

List of New ISH Life Members Joined from January 2018 to June 2018

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1370	Kalpesh Borse
1371	Divya k. Bhatt
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1373	Dr.Khadeeja Priyan
1374	Bhagvat Ghanshyambhai zolapara
1375	Sejal Dhyanesh desai
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