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CHAPTER CHAIRMEN

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PRESS RELEASE

A LANDSLIDE OF INTEREST FOR OCEANS'98 IN NICE

MARCH 1998

OCEANS'98 organized by the IEEE Oceanic Engineering Society in Nice on the French Riviera celebrates the second venue of the Conference in Europe. By the submission deadline, about 550 high quality scientific abstracts were received, coming from 34 countries. The resulting technical program will be made of oral and poster presentations, with more than 400 communications.

These communications will highlight new technology concepts, developments and applications which describe advances in science and engineering in the ocean environment. The topics encountered at OCEANS conference are roughly divided into three main fields:

– The traditional part which is the bulk of the conference deals with underwater properties measurements and characterization either from the point of view of underwater acoustics - including wave propagation, detection techniques, target classification and localization as well as transducer technology - oceanographic instrumentation - including wave and current measurements, profilers, buoys as well as optical and chemical instruments - or underwater vehicles (manned and autonomous). The classical problems of positioning, mission control and communication, being understood as the link between the three above mentioned topics.

– An emerging part, in terms of number of papers, seems to be linked to the more recent development of satellite data acquisition for understanding but also for surveying the ocean surface and for relating some of its features to the underlying oceans phenomena such as internal waves or bottom topography. Remote sensing is then in turn confronted to the overwhelming flow of information pouring from the sky and is closely linked to the development of image and signal processing methods and techniques and to the ever increasing need in computer processing power for better simulations, management of size increasing data bases and dissemination of information through the Web. This latter field is conceptually connected to the new development of Marine GIS (Geographical Information Systems) based very often on modeling and multi sensors data fusion.

– Finally, the future stays in the possibility by human kind to manage its resources which for a very large part (more than 70%) are closely linked to the coastal zones. This field is probably the one which can be the convergence point of the technical developments made by the researchers in the other topics. The Conference will focus on coastal zone management through coastal observation systems - including monitoring activities, water quality measurements and sediment transport - and ocean resource technology - ranging from ocean energy conversion to assessment of living resources, operational monitoring and deep ocean mining. Indeed, there is a need to improve a valuable interdisciplinary cooperation between natural sciences and political sciences.

The Conference will also be a great opportunity for European and American firms to display their products to a large audience of scientists and operational managers through a large State of the Art EXHIBITION in the fields of:

- Acoustic and Sonar System
- Oceanographic Instrumentation
- Underwater Vehicles
- Underwater Communication Systems
- Navigation/Positioning Fixing Systems
- Computing – Software – Simulation
- Data Storage and Transfer Systems
- Vision and Lighting Systems
- Cables – Connectors – Winches
- Power and Propulsion Systems

More than 150 booths will be set up in the Acropolis Convention Center covering a space of 40,000 square feet of Exhibition welcoming 3,000 visitors. Furthermore this exhibition will allow hundreds of scientists and R&D engineers to establish long term relationships through profitable exchange of ideas

This OCEANS will be set under the theme of Engineering for Sustainable Use of the Oceans which is also one of the theme for the European Union Marine Science and Technology (MAST) program. The year 1998 has also been elected as the "International Year of the Ocean and OCEANS'98 in Nice will take advantage of a wider European audience. Fifty Airlines maintain frequent flights to Nice International Airport which is only four miles away from Acropolis, the Convention Center for OCEANS'98. On the Mediterranean seaside, 30 miles south of 10,000 feet mountains, Nice and its close neighbors, Cannes and Monaco enjoy exceptional weather conditions and furthermore, the sunny French Riviera is a renowned technology center with 200 research labs and 11 universities.

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ARE YOU GETTING WHAT YOU WANT FROM OES?

Perhaps the question should be what do you want or expect from your OES membership? Why did you join OES? I think that the first reason we join OES is that we want to join other professionals in a society that is devoted to our work specialty or interests. We are interested in the publications that the society provides and the insight into new and emerging technologies. We are interested in the professional workshops that the Society provides, and we are also interested in the annual OCEANS Conference. Some of us that are located in the cities where we have Chapters are also interested in the interaction with our fellow members at the chapter meetings as well as the interesting programs that the chapter provides. Some of also joined OES to take part in the society activities and then found that we could also influence those activites by become active in the government of the Society.

How well has the Society met your needs? If you look at our Society membership statistics, they are not very good. In 1990 we had a membership of 2500. By the end of 1997 we had lost approximately 500 members. The question is why did we loose them? There are many reasons. During this same period there was a large downsizing in the defense industry and many of our members were no longer employed in oceanic type of programs. We also lost members by retirement and death. We also lost members because we were not providing the types of things they were interested in. One of the unfortunate things is that we did not fill the ranks with student members who could replace the departing members. We now have a new Membership Development Chairman, Dr. James S. Collins. One of Jim's plans is to contact former members to find out why they dropped their membership. He also plans to recruit members from the Conference Registration lists by contacting those who register, but are not society members. It is a challenge, but we can reverse the trend as membership in IEEE is beginning to grow once again.

A corollary to membership is membership upgrade. How many of you are eligible to become Senior Members, but just haven't done it? A lot of our membership joined at the Member grade and have never advanced as they have advanced in position in their profession. Senior membership is a recognition of your professional status and attainment. If you have been in the Member grade for five years, you are eligible to advance to Senior Member. If you are interested in this, please contact the Membership Development Chair, Jim Collins. Jim's address is: jcollins@tesla.UVIC.CA. He can supply you the application blanks and the information on upgrading your membership. Remember you have to be a Senior Member before you can be consider for elevation to Fellow.

Another area that demands attention is the situtation of the Chapters, especially those in Regions 1-6 (USA) and Region 7 (Canada). We have four US Chapters and two Canadian Chapters listed. About half of the Chapters are chapters in name only as they do not meet the requirement of two programs minimum per year. Our Chapters in Europe and Japan, while new, are doing well and keep active. We have a new Chapter Coordinator, Mr. Jim Glynn, who has accepted the challenge to get our US and Canadian Chapters healthy again. This is one place where you as members can contribute greatly. If you live in the Washington, DC, San Diego, Seattle, Honolulu, or Victoria BC, conatct your local IEEE Section and find out who the OES Chapter Chair is and find out about chapter meetings. Volunteer to serve as a chapter officer and most especially come up with ideas for chapter meeting programs. It should be noted that the best chapter programs are not the highly technical programs, but the more practical semi-techincal and ENTERTAINING type of programs. After a hard day of work, you are not interested in a highly theoretical program on sound propagation. You would be much more interested in a program on how they found ship wrecks off the Atlantic coast. We have the potential to get chapters started in the Gulf Coast region, Southern Florida, and New England. What we need are some members to step forward and say that they are interested and willing to work to establish a chapter. If you have an interest in Chapter Life, please contact Jim Glynn at j.glynn@ieee.org.

One way that you can be of help to the Society is by helping to recognize your fellow members who have distinguished themselve either technically or through their work for the Society. Now is time to send nominations to the Awards Chair, Joe Czika. As you know the Society has two awards that are given each year at the annual OCEANS Conference. The Distinguished Technical Achievement award can be given for distinguished technical achievement whether or not they are and IEEE/OES member. The Distinguished Service Award can only be given to an IEEE/OES member. For more information about these awards, please refer to the bylaws section in your Membership Directory. Send nominations to Dr. Joe Czika at jczika@tasc.com.

It is my hope that you are all satisfied with what you are getting from your membership in the Oceanic Engineering Society. I would be pleased to hear from you! I can be contacted at n.miller@ieee.org. Send you praise, gripes, or ideas! The key to a happy society is Communication! Please feel free to contact any of the officers at any time. To maximize your benefits from the Society, consider becoming active in it. Solicit new members. Become active in a Chapter. Upgrade your membership. Volunteer to be part of the OES Team!

Norman D. Miller
Vice President Professional Activities

Historical Overview: Current Measurement Technologies

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Abstract – Within the Ocean Engineering Society there is a Current Measurement Technology Committee. CMTC has held five working conferences and will hold its sixth conference March 10-13, 1999 in San Diego, CA. Through the material presented at these conferences and through Oceans conferences, trends in current measurement technology can be traced. Broadly, rotor and vane or propeller type measurements are giving way to acoustic Doppler type measurements. Mechanical sensors are still used but are being upgraded electronically while there has been an explosion of Doppler instruments in the last five years. Radar backscatter at various wavelengths give surface current maps as well as directional wave spectra and the number of such instruments and their acceptance is increasing. Acoustic travel-time current meters are a steady presence but electromagnetic and laser Doppler sensors are represented less often in presentations at conferences. Indirect means including drifters, altimetry, and hydrographic methods are used commonly and remain as important as they were several years ago. Sensors are getting smaller and measuring a wide variety of current related flows such as boundary layers, heat flux, and vorticity. Current meter development is a vigorous field.

I. INTRODUCTION

The Current Measurement Technology Committee of the IEEE Oceanic Engineering Society has held five conferences since 1978. In 1999, it will hold a sixth conference. The proceedings of these conferences provide a picture over two decades. As reported in a review at Oceans 96, papers generally include reports of current meter use, current meter inter-comparisons and validations, and current meter developments. The distribution has sometimes been weighted toward development, sometimes toward use. Papers reporting development often precede papers describing the use of a new technique by several years, implying a cycle. Combining the observations from the CMTC conferences with those from the Oceans conferences brings the last two decades to the present. Adding the accepted abstracts for Oceans 98 brings it slightly into the future.

II. HISTORY

The five proceedings of the CMTC conferences can be scanned for subject content and grouped by technology, by approach, and by stage of development. This can demonstrate trends in current measurement technology.

A. First Conference on Current Measurement - 1978

The first CMTC conference in 1978 addressed the technology of current measurement at the time and anticipated the technology of the future. Near-surface current measurements

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Editor's Note

In the last issue I announced that the OES newsletter would appear on the web. In a couple of weeks, you will be able to link to this issue through "online pubs" from the IEEE website <http://www.ieee.org>. We are interested in hearing what you think. Send your comments to me or Claude Brancart.

From the IEEE website you can get information on guidelines for starting new chapters, see <http://www.ieee.org/tab/guidelines.html>. Also there is a new Awards/Fellow Activities website, <http://www.ieee.org/awards>, from which members can obtain forms and submit major award nominations via e-mail. If you haven't already visited the OES homepage, the location is <http://auv.tamu.edu/oes/>.

If you have anything on society activity related web sites you would like to share, send them to me by e-mail.

Frederick Maltz,
OES Newsletter

AUV '98

A WORKSHOP ON AUV NAVIGATION

AUV '98 will be a two day affair taking place on 20 and 21 August 1998 at the Draper Laboratory auditorium in Cambridge, MA. The agenda will be a quantification of "where are we now" of components, systems, vehicles, and mission. Next, the topics of "where can we be" will discuss potential concepts that could be available in the next 10 to 20 years.

Considering the above, both topics and workshop venue, attendance will be limited. It is intended that approximately 25 selected papers will be presented. The conference papers and workshop summary and conclusion will be available in a bound volume after the conference. The Conference and Technical Chairpersons will do their best in identifying potential candidates focusing on AUV navigation issues.

The workshop will be a working event. Authors and presenters are expected to interact with each other. Best effort will be made to facilitate hotel arrangements. Thursday night, the intent is to move the workshop to a dinner cruise venue. Cost of the workshop will be minimal. More details to follow.

For further information, please view the home page

http://auv.tamu.edu/auv98 or send message to auv98@ieee.org attn: Claude P. Brancart.

Historical Overview: Current Measurement Technologies

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and the degradation of current measurements by surface mooring motion were themes of the conference. The need to obtain accurate measurements with vertical mooring motion and zero mean horizontal motion was stressed. Also, the need of the offshore community for current measurements was great.

USE of current meter data was a major part of the conference (16 papers out of 25). Only three papers were on developent of techniques although four discussed what should be measured. Four papers were inter-comparisons between sensors or tests of instruments. Most of the instruments considered (19) were in production. Six papers considered instruments not yet in production.

By far the dominant sensor mentioned was mechanical with 11 of the 21 references made or implied being to mechanical rotor/vane or propeller sensors. Lagrangian measurements were the next most often cited at four. Three electric field measuring or electromagnetic sensors and one each acoustic travel-time and radar backscatter sensors were discussed.

B. Second Conference on Current Measurement - 1982

At the second CMTC conference in 1982[2], acoustic Doppler measurements and profiles were discussed in three papers, a recognition of a velocity measuring technique that had previously been used routinely only in ship's logs. Mechanical sensors still were in the lead with nine references to rotor/vane or propeller sensors of a total of 31. Lagrangian drifters and electromagnetic sensors each had five. Acoustic travel-time and radar backscatter or satellite radar altimetry tied acoustic Doppler at three references each. Laser Doppler velocimetry appeared and several other techniques were also mentioned.

TESTING and INTERCOMPARISONS were discussed almost as often as use and applications. Development was considered half as often as testing and intercomparisons. Most of the sensors were prototypes or developments in the testing phase (13 out of 26 references). Only 10 papers were concerned with production instruments (38% vs. 66% in 1978). I believe this period to be the start of a surge in current meter development.

C. Third Conference on Current Measurement - 1986

At the third CMTC conference in 1986[3], acoustic Doppler made a major appearance. 13 references to acoustic Doppler techniques surpassed 12 references to mechanical techniques to measure current. Acoustic travel-time was the third most often mentioned technique, followed by electromagnetic sensors. Radar backscatter and Lagrangian drifters were each mentioned twice.

INTERCOMPARISONS were the subject of more than three times as many papers as either use and application papers or instrument development papers. Development was up compared to use.

Production instruments were considered most often, reflecting the increased number of commercial current meters that were available. Mention was made for the first time of an instrument no longer in production but still used.

TABLE I
SENSOR TYPES, AUTHOR APPROACHES, AND STAGE OF DEVELOPMENT

YEAR	1978	1982	1986	1990	1995
Type of Current Sensor in Papers by Percent					
Mech.	52	29	32	16	5
EM	14	16	8	14	3
AT	5	10	14	11	16
AD	-	10	35	35	43
RB	5	10	5	8	19
LDV	-	3	-	-	-
L/D	19	16	5	5	14
Other	5	6	-	8	-
Approach Taken by Authors in Papers by Percent					
Comp.	21	37	62	23	12
Use	67	44	19	23	39
Devel.	13	19	19	55	21
Stage of Current Sensors in Papers by Percent					
Idea	17	12	9	9	5
Test	25	50	30	37	40
Prod.	58	38	57	46	48
Retro.	-	-	4	9	7

D. Fourth Conference on Current Measurement - 1990

The fourth CMTC conference was held in 1990[4]. DEVELOPMENT had become fashionable again in 1990 with 17 of 31 submissions that I could classify falling into that approach. Use of techniques matched intercomparison of instruments as each had seven reports. Acoustic Doppler techniques were the most often reported with 14 out of 37. Mechanical sensors were next but the VACM had to be considered a retrofit instrument since it was no longer in production and the VMCM was shortly to follow. Then came electromagnetic followed by acoustic travel-time and that followed by radar backscatter. Drifters came last. The availability of production instruments permitted most of the sensors tested or used to be commercially available although three had gone out of production.

E. Fifth Conference on Current Measurement - 1995

At the fifth CMTC conference in 1995[5], the ADCP nearly eclipsed the other sensors. The most common theme of papers (16) focused on acoustic Doppler techniques with radar backscatter (7), acoustic travel-time (6), and drifters or Lagrangian techniques (5) trailing. Mechanical sensors were

TABLE II
SENSOR TYPES, AUTHOR APPROACHES, AND STAGE OF DEVELOPMENT

YEAR	1990	1991	1992	1993	1994	1995
TYPE OF CURRENT SENSOR IN PAPERS BY PERCENT						
Mech.	-	12	7	-	13	-
EM	-	-	-	5	-	10
AT	25	6	13	24	13	10
AD	25	47	60	48	19	70
RB	-	-	-	14	19	10
LDV	-	-	-	5	-	-
L/D	-	18	13	5	38	-
Other	50	18	7	-	-	-
APPROACH TAKEN BY AUTHORS IN PAPERS BY PERCENT						
Comp.	-	25	31	19	13	10
Use	25	19	-	33	20	50
Devel.	75	56	69	48	67	40
STAGE OF CURRENT SENSORS IN PAPERS BY PERCENT						
Idea	-	12	36	5	-	10
Test	75	47	14	33	60	-
Prod.	25	41	50	62	33	90
Retro.	-	-	-	-	7	-

considered in two papers and electromagnetic sensors in one.

The preponderance of ADCP papers reflected the availability of several commercial acoustic Doppler sensors at that time. They had begun to replace other sensors in studies of boundary layers and estuarine flow. Most of the papers (20) referred to production instruments although a substantial number (17) referred to prototype instruments or developments in the testing phase. Development was stressed more than use in 1995 (20 papers on development of techniques vs. 16 papers on use or applications). There had been a maturing of certain aspects of the current measuring field. The technology had advanced to support environmental studies in shallow water, to provide telemetry systems for real-time data return, and to increase coverage vertically with profilers and horizontally with radar backscatter sensors. There was a new class of problems that had first become visible in 1990: turbulence and boundary layer flow measurements. Where the ability to make quality measurements in the surface layer was a theme in 1978, the ability to resolve turbulence in a boundary layer was addressed by a number of authors in 1995.

Table I. summarizes the five CMTC conference proceedings in three sections: by type of current sensor, by the approach of the author, and by the stage of development of the instrument. For example, in 1978, more than half of the instruments considered in the papers were mechanical sensors (Mech.). Acoustic Doppler (AD), which were absent in 1978, became 43% of the instruments considered in 1995. Electromagnetic current sensors (EM) declined modestly while acoustic travel time (AT) rose from 5% to about 15%. Radar backscatter (RB) sensors increased substantially in 1995 to 19%. Lagrangian drifters (L/D) have been between 5% and 20% for the total period and will probably remain a small but important part of the current monitoring picture. Laser Doppler velocimetry (LDV) was only represented once, in 1982. Used extensively in the lab, it hasn't been presented at CMTC conferences.

The balance between intercomparison and testing papers (Comp.), use and applications (Use), and development papers (Devel.) has shifted over the years. Intercomparison and testing of current sensors peaked at 62% in 1986. Development has increased at the last two conferences to about 50%. One could imagine a sequence of development followed by testing which in turn was followed by use. This would be true for each sensor coming into use. Table I does not show that clearly except that intercomparisons and testing in 1986 preceded increased use in 1995. If this were true, the boom in development papers in 1990 and 1995 should lead to more intercomparisons in 1999 and these in turn to more papers on use in 2004.

There is a clearer picture in the sequence from idea papers (Idea) in which a new concept is presented but not yet reduced fully to practice and prototype testing and use papers (Test) in which they are used but not yet in production. The peak of idea papers in 1978 could be coupled to the peak in testing in 1982. This could then be related to the peak in papers referring to production instruments (Prod.) in 1986. The tail end, in which an instrument has gone out of production but is still being used and requires retrofitting (Retro.) peaks in 1990. The last conclusion, that in four or five years after papers report much use from a production instrument, that instrument will be out of production, is certainly not true. But it is true that such work horses as the VACM and the VMCM (Vector Averaging Current Meter and Vector Measuring Current Meter) were producing a lot of data in 1978, were still producing data in 1995, but went out of production, replaced by newer current meters less costly to build and maintain.

III. RECENT HISTORY

A tabulation of the papers from Oceans conferences of 1990 through 1995 is shown in Table II in the same format as the papers from the CMTC conferences[6,7,8,9,10,11]. Although there are fewer papers in each year at Oceans then each conference of CMTC, the trend can still be seen towards acoustic Doppler and radar backscatter and away from mechanical current sensors with acoustic travel time, Lagrangian drifters, and electromagnetic measurements about steady. More commercial instruments are available. Some testing and intercalibration is done but most of the papers are about development of techniques and applications of the techniques.

Since Table II was made in 1996, there have been two more Oceans conferences, 1996[12] and 1997[13], and abstracts

have been accepted for Oceans 98. Table III shows very recent trends from the small numbers of papers represented in these conferences.

The trend towards acoustic current meters is still increasing, especially acoustic Doppler, both profiling and single point sensors. Lagrangian drifters are still important. The radar backscatter sensors of current are being used but are not well represented in the sessions at Oceans. They are however being presented as wave sensors, one of their original uses.

Possibly the most telling statistic is that since 1995, almost half the talks have been based on instruments that are in production. So, although development is still significant, the current meter industry has a solid product line and these instruments are being used.

A. Acoustic Doppler Sensors

Acoustic Doppler current profilers, acoustic Doppler single point current meters, and correlation sonars have come of age. They have dominated every Oceans conference in the last six years but one. With their digital signal processors, high performance acoustic transducers and amplifiers, and large data rates, they are truly beneficiaries of advances in high tech fields such as digital speech processing and laptop computers, but they also have pushed certain technologies themselves. Broadband techniques have broken the sample frequency-speed resolution-range product limit of the earlier incoherent ADCPs and permitted their application in some configurations to turbulence measurements which require rapid sampling and high resolution of speed to resolve turbulent spectra. The penalty of sophisticated processing is the danger of tracking something other than the water velocity be it surface reflections, fish, or some combination of mooring motion and side lobes. This problem with false tracking has been addressed in papers at several Oceans conferences in recent years.

One of the greatest impacts of ADCPs has been the reduction in mooring costs for bottom mounted instruments. Particularly in shallow water, a profile of the entire water column is possible, except for a 15% ambiguous region at the top where side lobe reflection from the surface interferes. But fishing activities put these bottom mounted instruments at risk and this danger inspired a cottage industry of trawler proof ADCP mounts. Designed to direct trawl nets over the top yet be recoverable on acoustic command, at least three designs have been developed and several presented at Oceans conferences.

B. Lagrangian Drifters

Surface drifters play a continuing role in ocean research. Tracked by Argos or relaying GPS positions by Cellular phone, drifters benefit from high tech systems already in place. Subsurface drifters have remained important components of circulation studies, also using satellite fixing and data communication.

Lagrangian floats play an important role in mixing studies as well and several investigators are vigorously developing novel floats to study deep convection, internal wave shear, and boundary layer deepening. A steady flow of papers at Oceans conferences tracks these efforts.

C. Radar Backscatter

Commercial VHF and HF radar backscatter systems and experimental systems using military radars have shown the benefits of long range horizontal coverage that are possible. The technology has matured with a variety of systems available. Interpretation is not as simple and intercomparisons between radar and drifter measurements are important. Clearly the radar systems yield excellent information often.

Satellite observations of ocean currents and wind have long been sought. The leap from laboratory developments of radar backscatter models to satellite measurements needs more observations at the intermediate scale where the commercial radar backscatter systems are providing data. I expect to see papers comparing these observations in the future.

D. Acoustic Travel Time

A personal favorite of mine is the direct measurement of velocity in a small, defined volume with acoustic travel time velocity measurements. Papers on such systems have continued at a steady rate at about the 15% level. As this field has matured, variations in geometry, frequency, and platform have allowed acoustic travel time measurements to invade both top and bottom boundary layers, wave boundary layers, and internal shear layers.

TABLE III
SENSOR TYPES, AUTHOR APPROACHES, AND STAGE OF DEVELOPMENT

YEAR	1996	1997	1998
TYPE OF CURRENT SENSOR IN PAPERS BY PERCENT			
Mech.	5	-	-
EM	-	-	-
AT	18	27	25
AD	42	73	50
RB	5	-	-
LDV	-	-	-
L/D	25	-	25
Other	5	-	-
APPROACH TAKEN BY AUTHORS IN PAPERS BY PERCENT			
Comp.	25	18	25
Use	25	45	25
Devel.	50	37	50
STAGE OF CURRENT SENSORS IN PAPERS BY PERCENT			
Idea	10	-	-
Test	40	54	25
Prod.	45	46	75
Retro.	5	-	-

The acoustic current meter has made major inroads on the mechanical current meter for moorings, at least in the marketplace. In the current meter shops across America, there are still large inventories of well running rotor/vane and propeller current meters. Testing, calibration, and general acceptance of the acoustic current meter still lags the older mechanical technology, but this will pass as new papers suggest.

E. EM, LDV, and Other

The electromagnetic current meter in both commercial and experimental style is filling an important niche. EM current meters, used routinely in many studies, are frequently the standard against which other technologies, ADCP for example, are compared. In other configurations, electric field or magnetic field sensors are an important geophysical sensor and inadvertently a current sensor of vorticity sensor as well. Geomagnetic electro-kinetographs are alive as well.

LDV remains a small but important tool in turbulence studies, both as a small scale probe of turbulence and dissipation and to calibrate and intercompare with other sensors in flow near a boundary.

Correlation sonars, ship track discrepancies between GPS and dead reckoning, and wave gauge type measurements are grouped in Other in Table II. There are still more ways to measure current than those listed.

F. Approaches by Authors of Papers

In the last six years, most of the papers presented at Oceans in the current measurement area are development papers, either of a new instrument or of a technique of using the instrument. Fortunately, there have been a steady stream of comparisons between instruments or instrument test papers but it is at the 10% to 30% level. We need to know how well our measurement techniques work and calibration and intercomparison is one approach to this.

Use and interpretation of measurements by current sensors is ultimately the test of a new technology. Fortunately, papers on applications and use are present at the 20% to 50% level.

G. Stage of Development

A healthy mix of stages of development is represented by our papers over the last six years. Only in 1995 did I estimate dominance of reports of use and technique developments from instruments in production. Generally, half the instruments discussed have been commercial, the rest prototypes, special instruments, research tools, or ideas not yet reduced to practice.

An important part of our oceanographic business is keeping the stock of older, no longer supported current meters working. Upgrading loggers, adding sensors, and using rotor/vane and propeller current meters on new platforms, what I have classified as retrofitting, is effective and praiseworthy. A trickle of papers describing such endeavors is evident.

IV. CONCLUSION

Current measurement is a first order task in ocean process research, environmental monitoring, climate studies, ship traffic control, and offshore work. Vector measurements are always harder than scalar measurements, both to make and to interpret. Fortunately, we are working hard to provide these measurements and interpretations. The progression from idea, to prototype, to commercial product is evident in papers about current measurement over the last two decades. At least half a dozen techniques are developing in parallel, and each offers special advantages in certain tasks.

Some technologies, specifically acoustic Doppler and radar backscatter, have expanded rapidly. We still need testing, intercomparison, and most significantly interpreted data sets from measurements made with these techniques to gain an understanding of where they can be trusted and where not.

There is no saturation of the current measurement field. Although there is maturing in specific technologies, new technologies or re-inventions of older technologies spawn new cycles of development. This picture is invariant over the two decades reviewed.

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Biographical note:

Albert J. Williams 3rd (Sandy) received his A.B. in Physics at Swarthmore College in 1962 and his Ph.D. in Physics at Johns Hopkins University in 1969. He has spent his entire career at Woods Hole Oceanographic Institution as PostDoc in 1969, Assistant Scientist to Senior Scientist in the intervening years and served as Chair of Applied Ocean Physics and Engineering from 1987 to 1992. He is presently chair of the Current Measurement Technology Committee of the Ocean Engineering Society.

WHO'S WHO IN OES

Dr. Thomas Freud (named after his great great uncle, the originator of psychoanalyst) Wiener is the Treasurer of the Oceanic Engineering Society. He has been a member of the Administrative Committee for three years. This is his second year as Treasurer.

Dr. Wiener, an aerospace engineer with much experience in things maritime, is a Program Manager in the Sensor Technology Office of the Defense Advanced Research Projects Office. His special technical expertise spans the fields of imaging and non-imaging sensors, data processing, inertial guidance and automatic control, ocean surveillance, acoustic and non-acoustic anti-submarine warfare, and C3I. He currently directs high risk, high payoff research and development projects dealing with sensors and guidance systems.

Our treasurer is a native of Washington, D.C. The address on his birth certificate is 1812 K Street, N.W. Shortly after he was born his family moved out to the " suburbs" on Cathedral Avenue near the National Zoo.

As an undergraduate, Dr. Wiener attended Brown University, where he received his Sc.B. in Engineering. He was commissioned as an Ensign in the Navy as a result of his NROTC participation, and after a year at se on the world's first guided missile destroyer, he was selected for the first group of officers in the Junior Line Officers Advanced Scientific Educational (Burke) Program. He attended the Massachusetts Institute of Technology and studied Instrumentation at the Instrumentation Laboratory. His thesis was the first substantial work on strapdown guidance, and was the basis for the Apollo guidance system. After completing nuclear power training, Dr. Wiener served in nuclear submarines. He was Engineer Officer aboard the ballistic missile submarine George Bancroft during its construction and fitting out. He returned to George Bancroft as Executive Officer, and was Commanding Officer of USS Jack, a nuclear-powered attack submarine. Among it fascinating features was a direct drive contra-rotating propulsion turbine.

During his show tours, Dr. Wiener served as Director of the Officer Department of the Naval Nuclear Power School in Bainbridge, Maryland, and on the Permanent Staff of the CNO Executive Panel, a high level group advising the Chief of Naval Operations.

His final naval assignment was as Program Manager at DARPA where he initiated the Cruise Missile Detection Technology Program, now the Air Force's Air Vehicle Survivability Program. In addition, he directed the Autonomous Terminal Homing Program that weighed the utility and costs of several imaging sensors in a missile guidance application, and chose the two sensors to be carried into advanced development. Dr. Wiener also initiated a program using high-energy lasers for communications with submerged submarines (Strategic Laser Communications).

While at DARPA, in response to direction from the Undersecretary of Defense for Research and Engineering, Dr. Wiener initiated and managed a small program resulting in the conceptual design of a diesel-electric submarine carrying 48 cruise missiles. The program weighed the advantages of sea-based cruise missiles against alternatives in the European Theater. He also directed several programs using infrared focal plane arrays as the primary surveillance sensor.

After retiring from the Navy, Dr. Wiener was at TASC for over 14 years. While at TASC, he conducted analysis of and prepared reports on infrared and radio frequency surveillance systems. He prepared a detailed analysis of a broadband communication system for a classified project. He was the lead support engineer for a government customer planning for the integration of a new digital production system to replace an existing manual system. Dr. Wiener was also the principal science advisor for a non-acoustic ASW program. Among other assignments, he performed a detailed investigation of cruise missile survivability that suggested a new approach for designing and operating air defense radars. Dr. Wiener has also participated in several programs involving design and field testing of new systems.

He has been elected a Member of Sigma Xi, Tau Beta Pi, and Sigma Gamma Tau.

Dr. Wiener is a Senior Member of the IEEE and AIAA, and a Member of SPIE, USNI, USNSL, and SPEBSQSA.

IEEE-USA Backs Pension Portability Improvement Proposal

WASHINGTON, March 19, 1998 Dr. Timothy Grayson, representing the Engineering Employment Benefits Committee of The Institute of Electrical and Electronics Engineers - USA (IEEE-USA), strongly endorsed the new Retirement Account Portability (RAP) Act that was introduced today by Representatives Earl Pomeroy, D-N.D., Jim Kolbe, R-Ariz., and 17 other members of the U.S. House of Representatives. "Improvements in pension portability — like the ones in this bill — are urgently needed to enable increasingly mobile American workers, including engineers and scientists, to take their earned pension benefits with them from job to job, from one employment sector to another and even from one career to another," Grayson said at a Capitol Hill news conference today. He added: "I'm a recent graduate of the University of Rochester, and have already had four jobs in my chosen field. Since college, when I held research and teaching positions, I've worked as a university employee with a 403(b) plan and as a private sector employee with a 401(k) plan. Although I'm looking forward to a long and prosperous career with my current employer, statistical averages indicate that I will change jobs three or four more times before I retire. Unless I can transfer my pension benefits from one employer's plan to another, or roll them into or out of an Individual Retirement Account, I stand to lose a substantial part of my retirement savings."

Grayson cited U.S. Department of Labor research findings that two-thirds of the American workers who participate in employer-sponsored pension plans lose as much as 50 percent of their benefits under current patterns of job mobility and pension coverage. However, he said, the RAP Act will make it easier to transfer earned pension benefits from one employer's plan to another when workers change jobs and from one employment sector to another (e.g., from the public sector to the private sector) if they change careers.

According to IEEE-USA's Grayson, the RAP proposal will also loosen current restrictions on the use of Individual Retirement Accounts as portability vehicles. No matter where they work, individuals will be able to move pension benefits into and out of IRAs should they change or lose their jobs. "Greater freedom of choice and more administrative flexibility will enable more working Americans to save more for retirement — and keep more of their savings for use in retirement — as they move in and out of the workplace," stated Grayson.

Grayson praised Congressmen Pomeroy and Kolbe for their leadership in crafting an innovative legislative proposal that he said removes almost all of the current impediments to the transferability of benefits from one defined-contribution plan to another. In addition, he pointed out, the plan also helps to reduce another cause of portability losses by reducing vesting requirements in certain kinds of defined-contribution plans — since workers also lose pension benefits if they change jobs before earning a vested or irrevocable right to those benefits.

IEEE-USA promotes the careers and public-policy interests of 220,000 U.S. members of The Institute of Electrical and Electronics Engineers, the world's largest technical professional society.

IEEE-USA Invites Registrations for 1998 Consultants Directory

IEEE-USA has introduced an on-line registration form for its third annual DIRECTORY OF ELECTROTECHNOLOGY AND INFORMATION-TECHNOLOGY CONSULTANTS. Consultants interested in being included in the national print and Web directory have until April 1 to register for the 1998 edition, which will be unveiled by April 31. In 1997, 5,000 print directories were distributed to potential clients in industry and government, and 4,000 queries were logged over the searchable Web database at <www.ieeeusa.org/consultants>. For 1998, the directory offers expanded technical keyword fields and new categories for international consulting and technical language skills. To register by printed form or by computer disk, contact Bill Anderson at 202-785-0017, ext. 330, or w.anderson@ieee.org. To register on-line, see URL <www.ieeeusa.org/usab/BUSINESS/submit.html>. Cost is $75 ($50 for IEEE members) for Web or disk registrations, or $85 ($60) for print registrations.

New Salary Estimater Tells Engineers What They're Worth

WASHINGTON, Jan. 12, 1997 IEEE-USA has released a new career tool that will allow electrical, electronics and computer engineers to pinpoint their personal salary estimate. For the first time, electrotechnology professionals will have an effective and inexpensive way to evaluate their own current compensation and determine salary expectations for prospective positions.

SALARY BENCHMARKS: A PERSONAL WORKBOOK uses IEEE-USA 1997 salary-survey data to create a mathematical model to compute comparative estimates of pay for any of thousands of different employment situations. The workbook guides readers step-by-step through the formula and provides examples that illustrate uses of the data.

"Until recently, the typical way to measure your salary against the broader labor market was to keep an ear cocked to office gossip or wheedle reluctant acquaintances working at other companies," said Ross Anderson, chair of IEEE-USA's Survey Committee. "Our new salary workbook makes the process fast, easy and — most importantly — accurate."

Engineers can obtain SALARY BENCHMARKS: A PERSONAL WORKBOOK for $14.95 (members) or $19.95 (non-members) by calling 1-800-678-IEEE and asking for product no. UH-2976. The complete IEEE U.S. MEMBERSHIP 1997 SALARY AND FRINGE BENEFIT SURVEY (product no. UH-2966), containing 64 pages of detailed comparative salary charts and analysis, is still available for $74.95 (members) and $119.95 (non-members).

IEEE-USA promotes the career and public-policy interests of the IEEE's 220,000 U.S. members. The IEEE is the world's largest technical professional society, with a membership of nearly 320,000 electrical, electronics and computer engineers, and computer scientists, in approximately 150 countries.