

IAHR 70 YEARS – AND ITS PRESIDENTS

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The International Association of Hydraulic Engineering and Research IAHR was founded 70 years ago. It thus seems appropriate to review briefly the history of this leading association dealing with hydraulics and hydraulic engineering, and to present the IAHR Presidents who have largely influenced the development of this well-established, professional association. International associations have a particular tradition with congresses, either annually or bi-annually, during which their members exchange ideas and, thus, the meetings of each international association may be considered as a main activity, in addition to their regular publications.

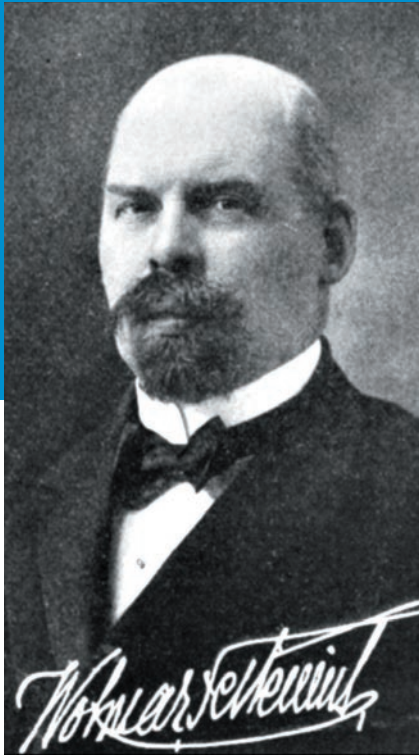
Engineering associations were founded as soon as the first engineering schools, or polytechnics as they were referred to then, opened their doors in the middle of the 19th century. Until 1900, all these associations were national, except for the International Congress of Navigation founded in 1882 in Brussels, Belgium. It appears that concerns with inland navigation were then of prime political, economical and technical interest and this organization exists as PIANC today. World War I was such a shock for both engineering and international activities that further associations were not created until the 1920s. For example, the International Union of Theoretical and Applied Mechanics IUTAM, was founded in 1922 by Theodore von Karman (1881-1963) and Tullio Levi-Civita (1873-

1941) in Innsbruck, Austria, with its first regular congress held in 1924 in Delft. The First World Power Congress was held shortly after in Tokyo, but the number of topics considered was too wide such that no further activities took place until after World War II. In 1928, the International Commission on Large Dams ICOLD was founded with headquarters in Paris, with an international congress held every three years. Many hydraulic engineers originally joined these activities, but found dam engineering too dominated by questions of geotechnical and material sciences. Hence IAHR was founded in 1935, and its first congress was held in 1937 in Berlin.

In the early 1930s, Germany dominated hydraulic research. An excellent review of research activities of that time is the famous book 'Hydraulic Laboratory Practice' edited by John R. Freeman (1855-1932) in 1929. This impressive review of the then existing laboratory facilities shows at once the leadership of Germany, up to 1933, when the Nazis took over power and the main German activities were directed towards World War II. In this article the Presidents of IAHR are introduced as a way of looking back into our history and seeing the past activities of a well-established international engineering association.

IAHR PRESIDENTS

The President of an association reflect the state and activities of the members. IAHR's Presidents chair the IAHR Council, consisting of three vice-presidents and 12 council members. The president normally stays for one or two terms of two years. The Association has had 15 presidents, and have tended to alternate between Europeans and Americans. To date, the USA has provided IAHR with five of its presidents; France was represented with three presidents, Germany with two, and Sweden, Japan, Australia, Norway and Canada each with one president. In addition to their organizational talents and membership of the 'international' engineering community, all these presidents contributed significantly to hydraulic engineering through education or research. The following sections highlight each personality with a short biography. Most of the biographical material was sourced from Hager (2003) and the IAHR Newsletters.



F E L L E N I U S 1935 - 1948

Wolmar Knut Axel Fellenius was born on September 10, 1876 in Viksberg, Sweden, and died from a stroke in his office on September 2, 1957 in Stockholm. He graduated as a civil engineer from the Stockholm Technical University in 1898 and then was a building inspector and chief of the Gothenburg harbor department until 1911. After lecturing at Chalmers Technical Institute from 1906 to 1911, he was appointed professor of hydraulics at the Royal Technical University of Stockholm in 1911. Fellenius founded there a hydraulics laboratory in the 1920s, and throughout his career he practiced as a consultant as well. before retiring in 1942.

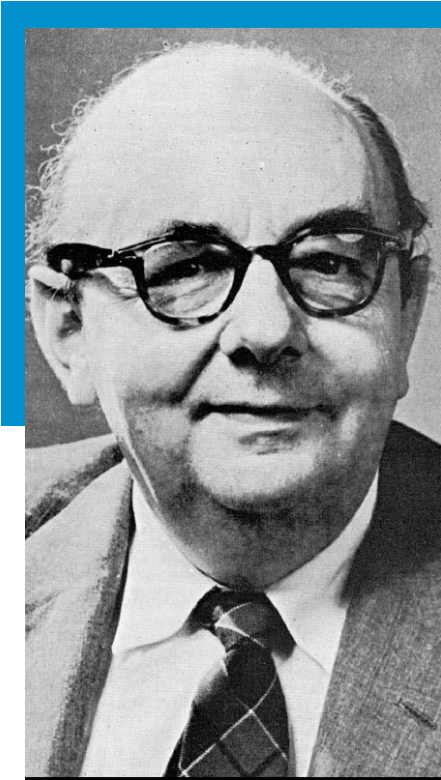
Throughout his professional career, Fellenius was an active civil engineer in particular with projects in harbor design, concerns in fisheries and in coastal engineering. He is remembered by the Fellenius method as applied to the stability of embankments using a graphical approach. He is considered a founder of soil mechanics, together with Karl Terzaghi (1883-1963) and Hans-Detlef Krey (1866-1928). Fellenius was experienced in the organization of associations, given that he presided over the Division of Technical Education of the Swedish Society of Engineers, and in the 1920s over its Highway Constructions and Hydraulics Division. Fellenius was IAHR president from 1935 to 1948 when the third IAHR Congress was held in Stockholm. He was an Honorary Citizen of Karlsruhe Technical University from 1921, and a Honorary Doctor of Darmstadt Technical University from 1936.



S T R A U B 1948 - 1955

Lorenz G. Straub was born on June 7, 1901 in Kansas City, and died from a stroke in his office on October 27, 1963. He was educated at the University of Illinois graduating with a PhD in 1930. During the late 1920s he was as a Freeman Scholar at the Universities of Karlsruhe and Berlin and thus became acquainted with European hydraulics. During his early career, Straub was engaged in the design of dams and in the translation of a German book on navigation hydraulics. In 1936 he published noteworthy research work on the transportation of sediment in suspension.

In 1930, Straub was appointed professor of hydraulic engineering at the University of Minnesota and director of the Saint-Anthony Falls Laboratory. Together with his colleague Alvin G. Anderson (1911-1975), Straub presented in 1958 original research on uniform flow of air-water flows in chutes. In 1948 he took over as the second IAHR president during the Stockholm IAHR Congress to stay in office for the following seven years. Straub was primarily responsible for the 1953 IAHR Congress held in Minneapolis as a joint ASCE-IAHR meeting. He was elected Honorary Member of IAHR in 1960. The Lorenz G. Straub Award was established in the late 1960s and goes to a PhD student with an outstanding research in hydraulics.



D A N E L

1955 - 1960

Pierre Danel was born on October 19, 1902 in Roubaix, France, and died on September 13, 1966 in Grenoble, France. He graduated from Ecole Centrale in Paris and entered the hydraulic laboratories Neyret-Beylier and Piccard-Pictet in Grenoble in 1928, the cradle of the later SOGREAH laboratories. Danel headed these laboratories from 1933 and in parallel was a Lecturer at Grenoble's Ecole Polytechnique.

Danel was an expert in agricultural hydraulics and in addition was involved in the design of hydraulic machinery. He founded the new series of the French hydraulics journal *La Houille Blanche* in 1945, a journal that continued after his death until today as one of the outstanding national hydraulics journals. Danel was elected president of IAHR in 1955 and held the office until 1960. He was actively involved in the foundation of new IAHR sections, such as of hydraulic machinery and cavitation in 1955, of maritime hydraulics in 1957, and of glaciology in 1959. Danel was a great organizer of national and international activities, and had less time as a researcher. During the 1957 Lisbon Congress, Danel proposed special symposia during the conventional congresses as an additional platform for exchanging ideas among specialists. A number of these symposia were later organized by Société Hydrotechnique de France SHF during national conferences with an international participation.



I P P E N

1960 - 1963

Arthur Thomas Ippen was born on July 28, 1907 in London UK, and passed away on April 5, 1974 in Belmont MA. He graduated from Aachen Technical University as a civil engineer and received from Caltech an MS in 1935 and a PhD in 1936. From 1938 to 1945 he was an assistant professor of hydraulics at Lehigh University, and from 1948 professor of hydraulics at the Massachusetts Institute of Technology MIT. Whereas Ippen worked in the 1930s and 1940s mainly on open channel hydraulics, he later turned his attention to coastal engineering, to saltwater intrusion, and to sedimentation processes. Ippen was also one of the founders of what we currently refer to as environmental hydraulics. Ippen retired from MIT in 1973. He was a Fellow of the American Academy of Arts and Science in Boston, and was awarded Honorary Doctorates from the Universities of Toulouse in 1963, of Karlsruhe in 1967 and of Manchester UK in 1968.

In 1960 Ippen was elected president of IAHR and thus organized the Congresses in Dubrovnik in 1961 and in London in 1963. He was the initiator of the *Journal of Hydraulic Research* in 1963 and founded a number of national IAHR committees, today's IAHR Regional Divisions. Finally, Art Ippen had an interest in international technical education and exchange of technical information. His input and wise foresight on matters concerning IAHR was remarkable. The Ippen Award was established posthumously to honor today's young hydraulicians with a most prestigious award in hydraulic engineering. The Ippen Award is presented biannually during the IAHR Congress and the Ippen Lecture delivered by the awardee.

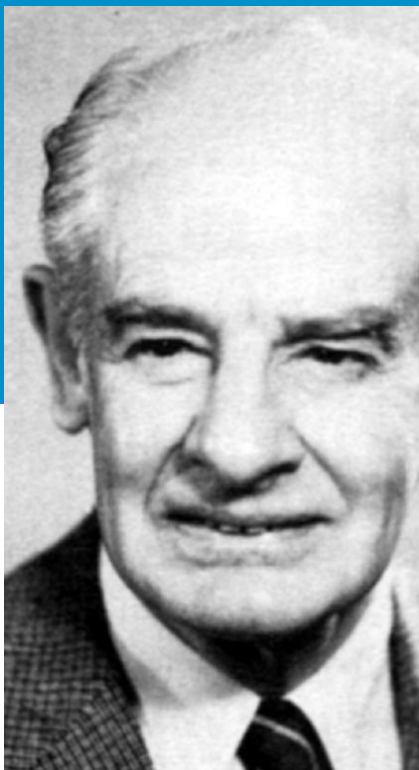


E S C A N D E

1963 - 1965

Léopold Escande was born on June 1, 1902 in Toulouse France and died there on September 13, 1980. He graduated as a mechanical and an electro-technical engineer from the University of Toulouse and there submitted a PhD thesis in 1929. From 1941 to 1972 Escande directed the Ecole Nationale Supérieure of Toulouse and headed the Toulouse hydraulics laboratory. From 1954, he was secretary general of the French National Science Foundation.

Escande was a worker and organizer of technical meetings throughout the world. His research topics were open channel flow, unsteady pipe flows, hydraulic similitude and sediment transport. He was a member of the Académie des Sciences from 1954 and received honorary doctorates from 17 foreign universities. Escande presided over IAHR from 1963 to 1965 and thus was involved in the Leningrad Congress in 1965. Whereas papers in German were no longer accepted in IAHR congresses after World War II, Escande was able to maintain both English and French as official IAHR languages. He was also known for considerable collaboration between France and Eastern European countries, with numerous young researchers finding in Escande a generous tutor.

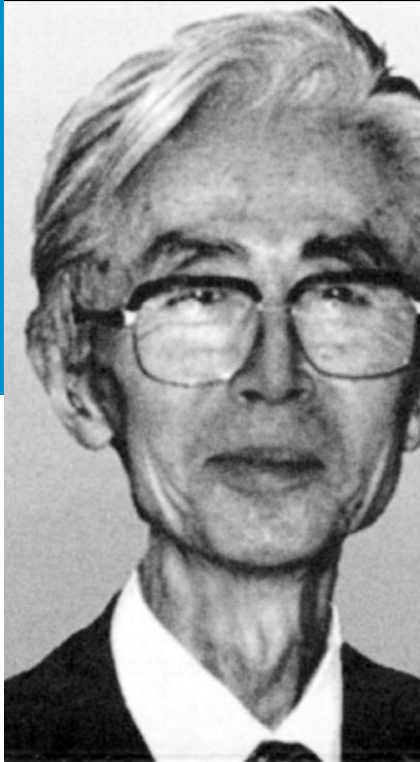


D A I L Y

1965 - 1971

James Wallace Daily was born on March 19, 1913 in Columbia MO, USA and died on December 27, 1991. He was educated at Stanford University, received his MS in mechanical engineering at Caltech, Pasadena, in 1937, and a doctorate in aeronautics in 1945. From this period stems his friendship with Arthur Thomas Ippen (1907-1974), whom he joined at MIT. In 1946, Daily was appointed assistant professor of hydraulics at the Massachusetts Institute of Technology MIT, and from 1949 to 1955 later becoming an associate professor and then appointed full professor of MIT until his retirement in 1980.

Jim Daily was an IAHR council member from 1964 to 1977, and president from 1968 to 1971. Thus, he was involved in the IAHR Congresses of Kyoto in 1969 and Paris in 1971. He further laid the basis for the divisional structure as IAHR presents itself today. He was bestowed with honorary membership in 1973 during the 15th IAHR Congress in Istanbul. Other honorary memberships of professional societies were those of the Japanese Society of Civil Engineers JSCE in 1973 and the American Association of Mechanical Engineers ASME in 1980. Daily had been a promoter of cavitation and hydraulic machinery in IAHR sections. He presented the 5th Hunter Rouse Lecture in 1985 in Buena Vista CA.



H A Y A S H I

1972 - 1975

Taizo Hayashi was born on June 28, 1920 in Nagoya, Japan, and passed away as a result of cerebral infraction on February 9, 1998 in Tokyo. After graduating from the University of Tokyo in 1942 he was appointed as Lecturer in the Department of Civil Engineering and received his PhD in 1953. In 1950, he joined the Chuo University in Tokyo which had been newly founded after World War II. He set up a hydraulics laboratory and stayed there until retirement in 1991. In 1950 Hayashi was a Fulbright scholar with an invitation to MIT in the USA. Later, he traveled to a number of countries and was knew well the international experts with whom he had a lifelong friendship. Hayashi is known for research in flood waves, based on a paper in 1955. In the 1960s, topics such as turbulence characteristics, stratified flows, eco-hydraulics and numerical simulation became en vogue and the Japanese contributed significantly. Over time Hayashi worked more in alluvial hydraulics and the formation of sand waves on river beds, the meandering of rivers, the turbulent structure of open channel flows and buoyant plumes.

Joining IAHR in 1961, Hayashi was from 1968 an IAHR vice-president and took over as IAHR president from 1972 to 1975, and remained as a co-opted Council Member from 1976 to 1979. Hayashi increased the number of Japanese members considerably and was closely involved in the organization of the 1969 IAHR Congress held in Kyoto.



H U G

1975 - 1979

Michel Hug was born on May 30, 1930 in Courson, France, graduating from Ecole Polytechnique and Ecole des Ponts et Chaussées in Paris. In 1956 he received a doctorate in hydraulics and fluid mechanics at the State University of Iowa, USA. He then joined the national electricity board EDF where he was engaged for the following decade on various problems in hydraulics at the EDF research center in Chatou. In 1966, Hug was appointed as EDF Regional director of planning and construction in Marseille and was thus involved in hydroelectric power plants on the Durance and the Verdon Rivers. In 1972 he was appointed as chairman of the planning, engineering and construction board and thus headed the French nuclear power program for the next ten years. In 1982 Hug was appointed president of the French National Coal Board and the associated chemical group CdF, and from 1992 to 2000 he was in charge of the Organization of Nuclear Energy Producers OPEN, where he developed new understanding of the relationships between European utilities faced with deregulation.

Michel Hug was elected president of IAHR in 1975 and stayed there until 1979. He had various teaching assignments at Ecole Polytechnique and at Ecole des Ponts et Chaussées. At the latter he was a professor of fluid mechanics from 1963 to 1980. He authored the books Applied fluid mechanics, and Change within the corporation: An experiment at Electricité de France. Earlier research work had been devoted to problems in cavitation, hydraulic machinery and laboratory questions. He was awarded in 1980 the title Commander of Légion d'Honneur and is an Honorary IAHR Member from 1985. Hug now lives in Croissy-sur-Seine, France.



K E N N E D Y

1980 - 1983

John Fisher Kennedy was born on December 17, 1933 in Farmington NM, USA and died on December 13, 1991 in Iowa City IA. He graduated from Notre Dame University in 1955 and received his MS and PhD degrees in 1956 and 1960, respectively, from Caltech. He joined the MIT faculty in 1961 and in 1966 succeeded Hunter Rouse (1906-1996) as director of Iowa Institute of Hydraulic Research. He received many honors and awards during his distinguished career. Kennedy was an expert in sediment transport and contributed significantly to the understanding of alluvial river processes. He also took interest in the management of waste heat from steam generation of electrical power, and in turbulent mixing of fluids.

Jack Kennedy joined IAHR in the early 1960s. He constantly looked for ways to increase IAHR's responsiveness to the needs of the membership and to make it appealing and relevant for young engineers. He was a Council Member from 1971 to 1975, IAHR vice-president from 1975 to 1981, and then IAHR president from 1980 to 1983. He was a co-opted IAHR Council Member to 1989, the year he was awarded IAHR Honorary Membership. During his term as president he introduced area membership representatives, new membership application brochures, and corporate membership. His enthusiastic devotion to the profession, his creativity and his ability to combine wisdom and wit to communicate his ideas merged to provide a unique example of excellence in leadership. He believed very strongly in the exchange of ideas between researchers and practitioners and felt that IAHR provided the most effective international forum to facilitate the interactions.



P L A T E

1983 - 1987

Erich J. Plate was born on July 14, 1929 in Hamburg, Germany. He graduated from Stuttgart Technical University as a civil engineer in 1954 and there submitted his PhD thesis in 1964. From 1954 to 1957 he was a Fulbright Student at Colorado State University CSU, returned then for two years to Stuttgart University before accepting in 1959 a CSU faculty position. He was appointed there professor of water resources in 1968 and from 1970 he was a professor at Karlsruhe Technical University. His research topics included water resources, waves, and pollution of water and air. Plate directed the Karlsruhe Institute for Hydrology and Water Resources in the 1970s. He was awarded the James Croes Gold Medal from ASCE in 1971. He was also awarded Honorary Membership of the Italian Hydrotechnical Association in 1986 and an honorary doctorate at Hannover Technical University in 1993.

Plate presided over IAHR from 1983 to 1987 after having been a Council Member and IAHR vice-president from 1973 to 1983. During his term, the Congresses of Moscow in 1983, Melbourne in 1985 and Lausanne, Switzerland, in 1987 were held. Plate was actively involved in the organization of the 1977 IAHR Congress, he initiated the History of Hydraulics book edited by Günther Garbrecht for the 50th anniversary of IAHR in 1985; he also proposed the IAHR Lecturership and he took over for a short period as IAHR Acting Executive Director during which period he organized the search committee for the present IAHR Executive Director. His main concern for IAHR was a wider presence in aspects of hydraulic engineering and research. Plate is an IAHR Honorary Member from 1993. He is still present at most of the IAHR Congresses and takes considerable interest in matters relating to IAHR publications and international activities.

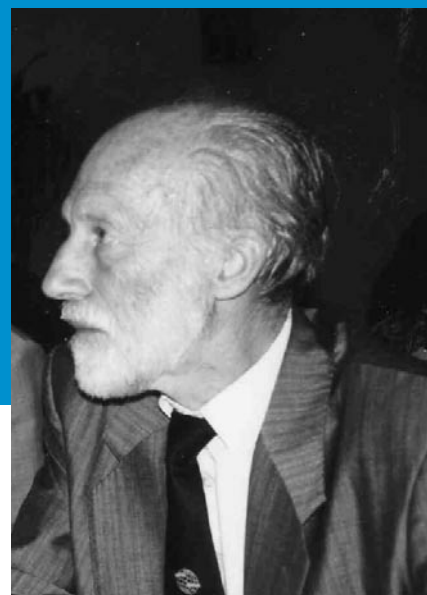


L A W S O N

1987 - 1990

John (Jack) Dempster Lawson was born on June 10, 1926 in Perth, Australia, and passed away on October 28, 1991 in Melbourne. He was educated as a civil engineer at the University of Western Australia in Perth from 1944 to 1949 and received a PhD title from the University of Aberdeen, UK in 1951. After a stint with the Snowy Mountains Hydroelectric Authority, he joined the University of Melbourne as a senior lecturer in 1954 and there designed a new Hydraulics Laboratory. In 1962, this facility was considered among the best in Australia. Lawson was involved in the 1960s with projects in coastal engineering, sediment transport, water hammer and environmental engineering. His collaboration into flow through and over porous media has been internationally recognized as a major contribution to practical dam design. Lawson was appointed Reader in 1964 and in 1970 took over the chair of civil engineering. From the 1980s, he served in a number of committees and contributed significantly to the wealth of civil engineering in Victoria.

Jack Lawson was associated with IAHR from 1980. He became an IAHR Council Member in 1982 and after two terms he was elected vice-president. During this time he organized the 1985 Melbourne IAHR Congress. At the 1987 Lausanne IAHR Congress, Lawson was elected president of IAHR until 1990. As of 1986, he was the Chairman of the IAHR Asia and Pacific Regional Division APD. Under his stimulating guidance the activities of the APD were successfully expanded. In council meeting discussions, Jack actively participated and had a sound judgment. As President he was a true and enthusiastic ambassador of IAHR. In 1989 when IAHR reframed its objectives and was looking for new avenues to pursue, Jack's views were of great help. He constructively proposed to incorporate systems management and wind erosion in the IAHR areas of activities. Lawson was missing during the 1990 APD bi-annual meeting in Beijing and the 1991 Madrid IAHR Congress because his illness already prevented him from attending then. He passed away at an age of 65 following a courageously borne illness.

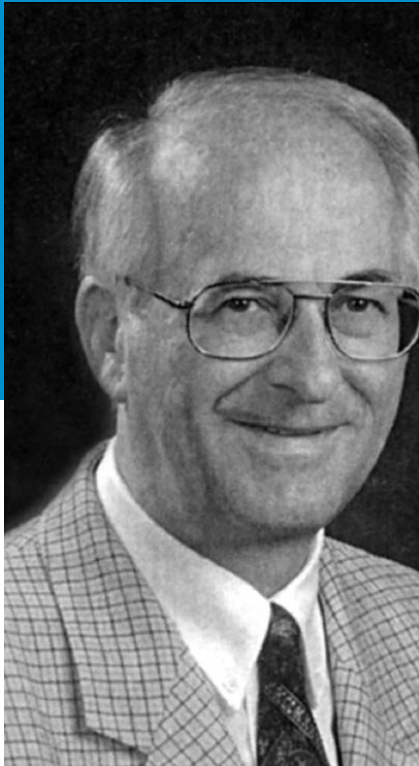


C A R S T E N S

1990 - 1995

Torkild Carstens was born on March 14, 1931 in Vadsø, Norway. He graduated as a civil engineer from the Norwegian Institute of Technology in Trondheim NTNU, obtained an MSc in 1958 from the University of Minnesota, Minneapolis USA, and a PhD from the University of California, Berkeley CA, in 1964. Carstens was appointed associate professor at NTNU in 1967 and in parallel was in 1968 a UNESCO consultant on multiphase flow at the Engineering College of Warangal, Andhra Pradesh, in India. From 1971 to 1972, he was professor of ocean engineering at the University of Alaska, Fairbanks, and in 1973 took over the River and Harbor Laboratory of NTNU as research head. At the same time, he was a professor of hydraulics at NTNU until his retirement in 2001. Carstens contributed during his career to various questions in hydraulic research, among which ice flows played a major role. In addition, he worked on questions of turbulent diffusion and entrainment in two-layer flow, in transport processes in rivers and lakes, in heat exchange and frazil ice formation, in seabed scour by currents near platforms and in satellite imagery of boundary currents. He authored also the chapter Ice Mechanics in the River and Lake Ice Engineering book.

From the mid 1980s he became an IAHR vice-president, and took over the presidency from Jack Lawson in 1990, thereby following IAHR regulations according to which the eldest of the three vice-presidents is elected to president in such cases. Carstens presided over the Association during the Congresses of Madrid in 1991, Tokyo in 1993, and London in 1995. A novel differentiated fee structure was introduced for IAHR members during his term permitting reduced subscriptions for members from poorer nations. In Tokyo, the World Water Council was established with the main goal of attracting worldwide attention to water issues, with Carstens as the IAHR representative. Carstens actually lives in Slemmestad, Norway.



K O B U S

1995 - 1999

Helmut Kobus was born on May 17, 1937, in Stuttgart, Germany. After graduation as a civil engineer from the Technical University in Stuttgart in 1961, he moved for four years to the Institute of Hydraulic Research of the State University of Iowa, USA to submit in 1965 his PhD thesis. There he also translated two books from the Bernoulli family from Latin into English. In 1966, Kobus returned as a post-doc to the Technical University of Berlin and from 1968 headed the hydraulics laboratory of the Technical University of Karlsruhe, where he submitted his habilitation thesis in 1973. In 1977 Kobus was appointed professor of technical hydromechanics at Stuttgart Technical University, a position he held for the following 25 years until retirement. During these years, Kobus was interested in the numerical simulation of groundwater and heat flows, in water pollution and its hydrodynamic description, after having contributed to the characteristics of air-water high-speed flows in the mid 1970s.

Kobus was an IAHR Council Member from 1988, was then an IAHR vice-president from 1991 to 1995 and elected IAHR president during the 1995 IAHR London Congress. His particular impact on IAHR was the combination of education and research and as promoter of IAHR student chapters which are becoming widely spread. Kobus also worked towards a greater emphasis on hydraulic engineering practice within the IAHR organization. This led to the establishment of new technical

IAHR sections and to an amplification of the associations official name to 'International Association of Hydraulic Engineering and Research' IAHR. Kobus was awarded Honorary Doctorates from the Technical University of Bucharest, Romania, in 1995 and in 2002 from the Technical University of Karlsruhe; in 1996 he received an Honorary Professorship from the Sichuan Union University in Chengdu, China. Kobus stepped down as IAHR president during the 1999 Graz IAHR Congress. He actually lives in Stuttgart, Germany.



H O L L Y

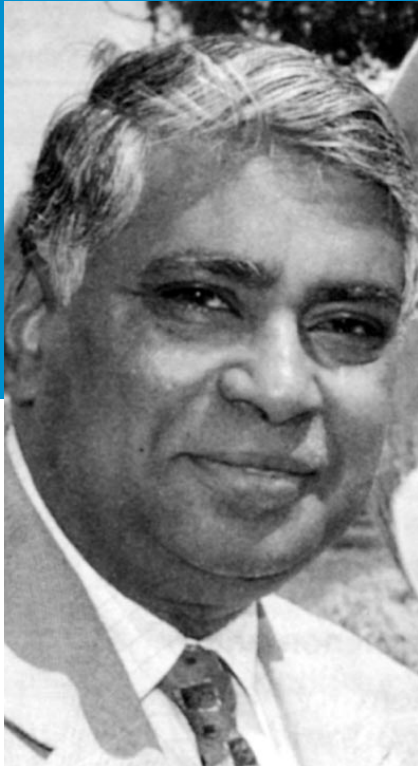
1999 - 2003

Forrest M. Holly Jr. was born on April 1, 1946 in La Jolla CA USA. He graduated from Stanford University in 1968, received an MS from the University of Washington one year later and the PhD title in 1975 from Colorado State University. Holly then moved for five years to SOGREAH Grenoble in France, where he developed mathematical models for application to various hydrodynamic phenomena and co-authored a text on Computational hydraulics. Holly was appointed hydraulics professor at the Iowa Institute of Hydraulic Research IIHR in 1982 and still lives in Iowa City, USA. Though he enjoyed teaching and interacting with students, he never saw himself as a career-long academic, because he found the practice of engineering to be so gratifying. Holly thus retired from IIHR in 2003 to concentrate on his own consulting company H&A Associates. He is an antique clock repairman, and a flight instructor certified for private and commercial flights and instrument instruction. He is presently also translating a historical hydraulics book from French to English, among a number of other professional commitments.

Holly was elected IAHR president during the 1999 Graz IAHR Congress, a position he filled for four years until the 2003 Thessaloniki IAHR Congress, thereby also taking responsibility for the Beijing IAHR Congress in 2001. He considered his term as an IAHR president as a period of transition and change, given that (1) the IAHR Secretariat moved from Delft to Madrid, (2) establishment of a professionalized secretariat with a full-time Executive Director, (3) active student chapters were launched, and (4) a new council election procedure was implemented in IAHR. Holly's dynamic nature was reflected in his presidential years with IAHR, leading the association into the 21st century with a more appealing look and better prepared to cope with the members' needs.



M A N S A R D



Etienne Mansard was born on October 9, 1946 in Karaikal, India, one of the old South-Indian French territories. He obtained his civil engineering degree from the University of Annamalai and his MTech in hydraulics from the Indian Institute of Technology in Madras. Three years later he moved to the Grenoble University in France where he acquired his PhD thesis in 1976. He joined the National Research Council of Canada NRC in 1976, and is now Executive Director of the Canadian Hydraulics Centre of NRC. During his career, he developed several state-of-the-art concepts for the simulation of sea states in laboratory basins to advance the understanding of the complex physics involved in wave-structure interactions. He is currently an expert in laboratory reproduction of waves, and has participated in several international committees on waves and breakwaters.

Mansard's contribution to IAHR initiated from 1981 with international working groups on comparative data analysis. He would like to foster such collaborations and make IAHR one of the focal points for research in maritime hydraulics. He sees IAHR in the new millennium as one of the primary organizations that can act as a forum for facilitating decisions on important global issues related to water resources and hydraulics. Mansard was chairman of the IAHR Maritime Hydraulics Section from 1993 and was elected IAHR Council Member during the 1997 San Francisco IAHR Congress, and IAHR vice-president during the 1999 Graz IAHR Congress. During the 2003 Thessaloniki IAHR Congress, Mansard was elected President of IAHR. Mansard would like to support IAHR

as a leading organization in hydraulics and would like to take the challenge of reaching out more to applications-oriented clients and to the corporate members by identifying and addressing their requirements. He looks forward to continuing collaborating with the Council and all IAHR members to increase the impact of the IAHR organization on the international community of hydraulic engineers and decision makers.

CONCLUSIONS

IAHR is considered the leading global organization in hydraulic engineering and research. This professional organization commemorates its 70th birthday, and has moved successfully into the new millennium. The biannual IAHR Congresses are considered as an essential focal point for advancing hydraulic research needs through the different IAHR Sections, in addition to meeting colleagues and friends working on similar problems, and with whose ideas and support our problems may be solved. This article aims at highlighting the major activities of an international association by presenting their presidents. The conclusion may be: Long live IAHR, long live hydraulic research!

REFERENCES

Freeman, J.R. (1929). Hydraulic laboratory practice. ASME: New York.

Garbrecht, G. ed. (1985). Hydraulics and hydraulic research – A historical review. Balkema: Rotterdam.

Hager, W.H. (2003). Hydraulicians in Europe 1800-2000. IAHR: Delft.

Schoemaker, H.J. (1985). 50 years of the IAHR. Hydraulics and hydraulic research – A historical review: 345-353. Balkema: Rotterdam.

In addition, various IAHR Newsletters were consulted for additional information. I would also like to acknowledge personal telephone call with several of the living IAHR presidents, which allowed me insight into the main changes that occurred under their terms.