AKADÉMIAI KIADÓ

In memoriam: Prof. Dr. Miklós Iványi 1940–2013

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IN MEMORIAM

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TRIBUTE 1
REMEMBERING PROFESSOR MIKLÓS IVÁNYI A DECADE OF TRIBUTE

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Preface

It is with solemn remembrance that we pay tribute to Prof. Miklós Iványi, who, in the year 1963, embarked upon a distinguished career, joining the Department of Steel Structures at the Faculty of Civil Engineering, Budapest University of Technology and Economics. He dedicated four decades of his life to this profession, leaving a mark on its advancement. In his final ten years of service, he brought his expertise to the Faculty of Engineering and Information Technology at the University of Pécs, where his contribution continued.

Prof. Miklós Iványi departed from our midst on December 21, 2013, having lived a remarkable 73 years. His departure has left a void in the world of engineering and education, but his legacy endures an everlasting testament to his enduring contributions and dedication.

The professor

His scientific interest was on Steel and Steel-concrete Composite Structures: stability and ductility of steel structures; behavior of structural joints; fatigue of steel structures; refurbishment of structures. He worked on Computational Steel Structures Technology: stability and strength of steel structures by finite element analysis. He evaluated several Experimental Tests of Structures: reduced and full-scale tests.

As a member of universities his teaching activities were: undergraduate, graduate and postgraduate courses in Steel Structures, Steel and Composite Bridges, Steel Buildings, Stability Problems of Steel Structures, Plasticity Problems of Steel Structures in Hungarian and English languages.

From 1997 to 2008 years Prof. Mikós Iványi with his Department of Steel Structures, Faculty of Civil Engineering, Budapest University of Technology, Hungary participated in the European educational and research projects – which has the aims to modernize the university level education both on content and methodology – were to harmonize the teaching materials, regarding to the requirements of the industrial and the engineering life and to help the initiation and the familiarization of the Eurocodes. He took part in several international projects (Leonardo da Vinci Programs and TEMPUS JEP ones). In the frame of this activity several books, lecture notes, CD materials have been created:

Ottó Halász and Miklós Iványi, *Stability Theory Principles and Methods for Design of Steel Structures* (in Hungarian). Akadémiai Kiadó, Budapest, 2001, (Fig. 1.1a);

Miklós Iványi, *Bridge Construction, Steel Structures* (in Hungarian). Műegyetemi Kiadó, Budapest, 1998, (Fig. 1.1b);

Miklós Iványi, Péter Iványi, *EUROCODE-Manual, Design of Multi-Storey Steel Buildings* (in Hungarian). Pollack Press, Pécs, 2008 (Fig. 1.2a);

Miklós Iványi, László Horváth, Miklós Iványi Jr., *Case Studies of Steel Structures* (in Hungarian). Pollack Press, Pécs, 2008, (Fig. 1.2b).

a) b)

Fig. 1.1. a) Stability theory, b) Bridge construction

a) b)

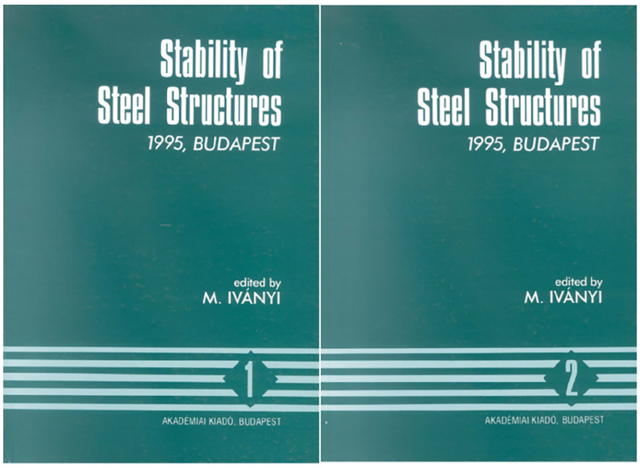
Fig. 1.2. a) Design of multi-storey steel buildings, b) Case studies of steel structures

The scientist

With the gradual development of rules for designing against instability, the idea emerged to hold an International Colloquia on Stability treating every aspect of structural instability of steel structures. International schools were organized in Budapest and at the International Centre of Mechanical Sciences in Udine, Italy. These schools were intended to provide a forum for an international exchange of new knowledge, for making closer contacts among more experienced and younger researchers and structural engineers, and to offer the opportunity for personal discussions. For each of the courses, a volume containing the lecture notes provided by the lecturers were issued.

It was later proposed to enlarge Colloquium in Hungary. The goals of the Colloquia were to consolidate the status of the available knowledge and to plan and priorities the need for future research. Problems in applying existing stability design criteria have been created by the use of higher-strength materials used in more open-framed structures, unique architectural layouts, analytical computing capabilities, and an information explosion in stability-related publications.

M. Iványi, ed., *Stability of Steel Structures.* vols 1 and 2, Budapest: Akadémiai Kiadó, 1995, (Fig. 1.3).



a) b)

Fig. 1.3. Fourth Hungarian Colloquium

Prof. Mikós Iványi has also an interest in bridges. By his proposal a conference series has been started since 1992 entitled "Bridges on the Danube." The conference series was based upon a wide cooperation of universities and other institutes in the Danube region. It has provided opportunities to scholars, tutors, and practitioners of technical and historical disciplines receptively to exchange their ideas, opinions, observations, and scientific results as well.

On the occasion of these conferences a collection of the Danube bridges had been initiated. The catalogue comprises the major details, diagrams, photographs and descriptions of the designing and constructing phases of the bridges on the Danube in English. The first part of the CD comprises a catalogue of the bridges on the Danube, while the second part is a brief summary of the built structures,

Bridges on the Danube, CD Catalogue, Prof. Miklós Iványi, editor-in-chief, 1998, (Fig. 1.4).

Fig. 1.4. Catalogue of Danube bridges

There are always great expectations when a university faculty embarks on a new 'international' venture. This situation was no different when Pollack Periodica, An International Journal for Engineering and Information Sciences has been published for the first time. The foundation of this journal was by of the editors Prof. Mikós Iványi (Fig. 1.5). The journal of Pollack Periodica wanted to be a forum for lecturers, researchers, PhD and DLA students. The success of the journal can be seen in many papers and issues that have been published in the past 20 years and in its continual growth up to the present days.

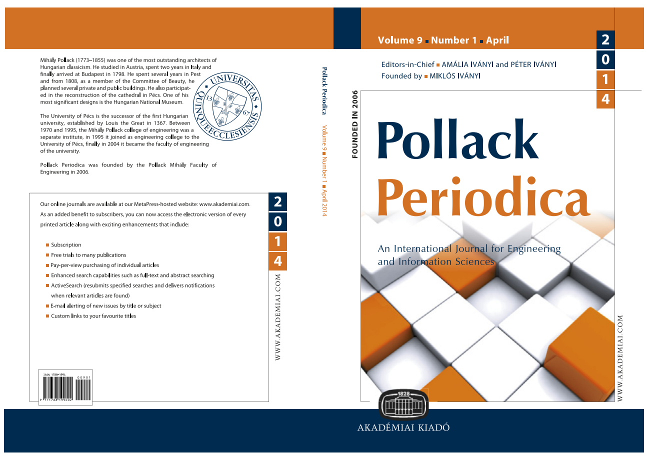


Fig. 1.5. Cover of Pollack Periodica in 1014

TRIBUTE 2
GENERALIZED ANALYSIS OF COMPOSITE CROSS-SECTIONS

Aarne JUTILA

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Preface

The present author had the honor to get acquainted with Prof. Dr. Miklós Iványi in the 14th IABSE Congress garden party in New Delhi, India, in March 1992. A mutual sympathy, friendship and professional interest was at once created. Due to that, frequent series of lectures and mutual visits resulted in Hungary and Finland. A remarkable step was achieved, when a bilateral agreement within the Socrates Program between the Technical Universities of Budapest and Helsinki University of Technology was signed in September 1998. Part of that was later extended to cover also Oulu University in Finland and Tallinn University of Technology in Estonia. All in that activities Professor Iványi plaid key role.

Besides individual presentations, three doctoral lecture courses on orthotropic steel bridges are worth of mentioning. Two of them were arranged at Helsinki University of Technology in April 2002 and 2003, respectively, and the last one, a two-weeks course, partly at Helsinki University of Technology and partly in Oulu, in December 2006. These courses formed a prominent part of doctoral studies at both universities in Finland (Fig. 2.1).

Fig. 2.1. Professor Miklós Iványi lecturing at Oulu University, Finland, in April 2001

One more remarkable contribution still to mention is the "Bridges on the Danube Catalogue", published in 1993, where Professor Miklós Iványi was the Editor-in Chief. This extensive catalogue gives a comprehensive picture of the bridges built over the Danube in Central and Eastern Europe. It forms an essential guide to all those, who possess only inadequate knowledge of the Danube Basin.

Professor Miklós Iványi was a cheerful and positive person, to whom it was no difficulty to bind relationship with other people. Because of that and his widely known scientific contributions it is no wonder that he was easily able to form both domestic and international relations. A good example of the latter ones is the fruitful scientific and friendship cooperation of four well-known bridge and structural engineering professors coming from Finland, Hungary, Japan and Slovakia, where, again, Professor Miklós Iványi's role was essential, (Fig. 2.2).

Fig. 2.2. Dr. Herbert Träger, Prof. Aarne Jutila and Prof. Miklós Iványi on the 5th International Danube Bridge Conference Dinner in Budapest in September 2007 (Photo: Victor Popa, Romania)

Summary of the technical part underneath

Steel-concrete composite bridge design was considerable advanced, when several studies and books related to composite action were published in the 1950's and early 1960's. Especially worth of mentioning are Sattler's "Theorie der Verbundkonstruktionen" 1952, Hawranek and Steinhardt's "Theorie und Berechnung von Stahlbrücken" 1958 and Fritz's "Verbundträger" 1961. All these books handle only four materials at the most: concrete, steel, reinforcing steel and prestressing steel. However, the theory behind can be extended to any amount of materials, and that is what is done in the present paper. That is why there can speak about a generalized theory. Additionally, stiffness values are used instead of rigidity values, which makes the mathematical formulation simpler compared especially to Hawranek's formulation. Finally, a sign mistake in one of Fritz's main formulas is pointed out.

Background. Three German books, Sattler's "Theorie der Verbundkonstruktionen", Hawranek and Steinhardt's "Theorie und Berechnung von Stahlbrücken" and Fritz's "Verbundträger", written in traditional engineering style in the 1950's and early 1960's, form a firm basis fort the analysis of composite structures. The cover pages of these books are shown in Fig. 2.3. All of them, however, are restricted to steel-concrete composite girders, which of course cover the major part of long-span girder structures common in big structures like bridges.

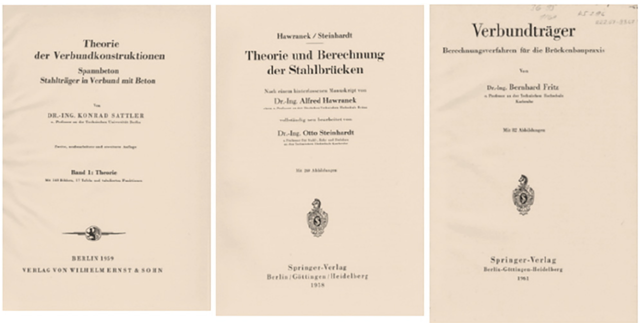

Fig. 2.3. Cover pages of the books of Sattler, Hawranek and Steinhardt, and Fritz

The theory behind, however, can easily be extended to multi-material structures that already exist when, for instance, fiber-based structures are developed in construction process. Similar new and unique theory is presented below.

Mathematical formulation. Let us consider a girder, whose cross-section consists of n different parts having each its own material properties. Let the axial stiffness and bending stiffness of a general part i be C_i and D_i, respectively. Here D_i, means bending stiffness with respect to the own principal axis of part i.

As common, the assumption of Bernoulli-Navier is supposed to be valid. That means that a plane perpendicular to the girder axis, here axis x, remains as a plane after the deformation of the girder. The consequence of this assumption is clearly shown in Fig. 2.4.

In Fig. 2.4, a longitudinal section of the girder studied is shown. The length of the section is considered to be *1* (number one), the coordinate axis system in a cross-section is chosen so that axis y is pointing downwards and axis z is horizontal on the level of the reduced center of gravity axis of the cross-section according to the right hand's rule. Deformations due to shrinkage, creep, temperature changes, axial forces and bending moments around the z-axis, respectively, are considered. During deformation the vertical line originally at distance *1* from the section's left end is moved to the right and inclined. Consequently, each part of the girder is stretched and inclined accordingly.

The symbols used in Fig. 2.4 are the following: i is the number of material; n iss the total number of different materials in the cross-section; y is the coordinate measured from the reduced center of gravity axis of the cross-section; y_i is the coordinate of the center of gravity axis of part i; N_i is the axial force in part i; M_i is the bending moment in part i; ε is the relative axial elongation at the level of the reduced center of gravity axis; ε_i^o is the relative axial elongation at the level of center of gravity axis of part i, when no composite action exists; κ is the curvature of the cross-section due to deformations.

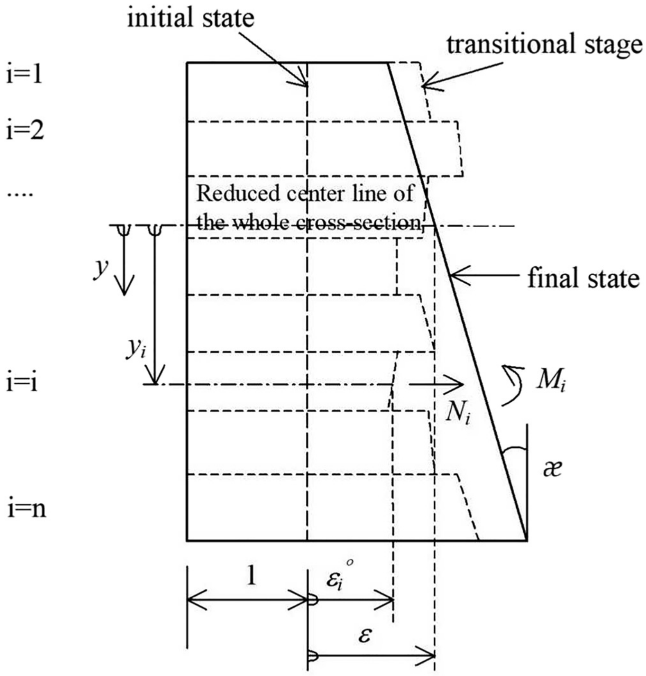

Fig. 2.4. Longitudinal section of the girder used to develop the present theory

Due to definition of the reduced center of gravity axis

$$\sum C_i y_i = 0, \tag{1}$$

where C_i denotes the axial stiffness of part i (equal to $E_i F_i$ in Fritz's formulation). For the whole cross-section

$$C = \sum_i^n C_i \tag{2}$$

and

$$D = \sum_i^n \left(C_i y_i^2 + D_i\right) \tag{3}$$

where C is the axial stiffness and D is the bending stiffness of the whole cross-section with respect to z-axis, respectively, and D_i is the bending stiffness of part i when bending occurs around its own horizontal center of gravity axis (the corresponding symbols used by Fritz are K for C and S for D, respectively).

Due to temperature changes, shrinkage or any other similar reason part i undergoes elongation or curvature so that the free relative elongation is ε_i^o and the angle of curvature is k_i^o, respectively. To make the cross-section to remain plane (Bernoulli's assumption), in each part i axial force N_i and bending moment M_i are needed. If the final relative elongation on the level of the reduced center of gravity is ε and the final curvature is κ, then the constitutive equations related to part i have to obey the laws

$$N_i = C_i\left(-\varepsilon_i^o + y_i\right) \tag{4}$$

and

$$M_i = D_i\left(-k_i^{\mathrm{o}}\right). \tag{5}$$

Because no resulting forces or moments exist,

$$\sum N_i = 0 \tag{6}$$

and

$$\sum \left(N_i y_i + M_i\right) = 0. \tag{7}$$

Considering Eqs (1)–(5), from Eqs (6) and (7) it follows that

$$\varepsilon = \frac{1}{C}\sum C_i \varepsilon_i^{\mathrm{o}} \tag{8}$$

and

$$k = \frac{1}{D}\left(\sum C_i y_i \varepsilon_i^{\mathrm{o}} + D_i k_i^{\mathrm{o}}\right). \tag{9}$$

Finally, at any point of part i, the axial stress

$$\sigma_i = E_i\left[-\varepsilon_i^{\mathrm{o}} + y - k_i^{\mathrm{o}}\left(y - y_i\right)\right], \tag{10}$$

where E_i is the modulus of elasticity of the material at the same point.

Special case 1: shrinkage. Only one part r is elongated by an amount of $\varepsilon_r^{\mathrm{o}}$, i.e., $\varepsilon_i^{\mathrm{o}} = 0$, when $i \neq r$ and $\varepsilon_i^{\mathrm{o}} = \varepsilon_r^{\mathrm{o}}$, when $i = r$. For each value of i $k_i^{\mathrm{o}} = 0$. Thus, in this case,

$$\varepsilon = \frac{C_r}{C}\varepsilon_i^{\mathrm{o}}, \tag{11}$$

$$k = \frac{C_r y_r}{D}\varepsilon_i^{\mathrm{o}}, \tag{12}$$

$$\sigma_i = \begin{cases} E_i \varepsilon_r^{\mathrm{o}}\left(\dfrac{C_r}{C} + \dfrac{C_r y_r y}{D}\right), & i \neq r, \\ E_i \varepsilon_r^{\mathrm{o}}\left(\dfrac{C_r}{C} + \dfrac{C_r y_r y}{D} - 1\right), & i = r. \end{cases} \tag{13}$$

In bridge construction a common situation is that a girder consists of four materials at the most, namely concrete, steel, reinforcing steel and prestressing steel. In these structures only one material, i.e., concrete shrinks, but it causes elongation, curvature and stresses in all parts. These are mainly dependent on the properties of the shrinking material, but also of the stiffness properties of the whole cross-section. Only one formula, respectively, is needed to cover elongation and curvature, but for stresses it is not the case. One formula is needed to cover the stresses in the shrinking part and another one for the other parts, as it is shown by Eq. (13).

When comparing the latter formulation of Eq. (13) with the corresponding equation derived by Fritz (Fritz's Eq. (C.14)) a discrepancy can notice between them. The sign of the second term of Eq. (13) is plus, but in Fritz equation it is a minus. According to the present author there is a printing error in Fritz's formulation, which, however, has been corrected later in (Fritz's Eq. (C.92)).

Special case 2: uneven but linear change of temperature. As a second example let us consider a linear vertical change of temperature through the structure. Let us assume that temperature increase on the top level is t_{o} and on the bottom level t_u. The height of the structure is h and the coefficient of thermal expansion λ is equal in all materials (Fig. 2.5).

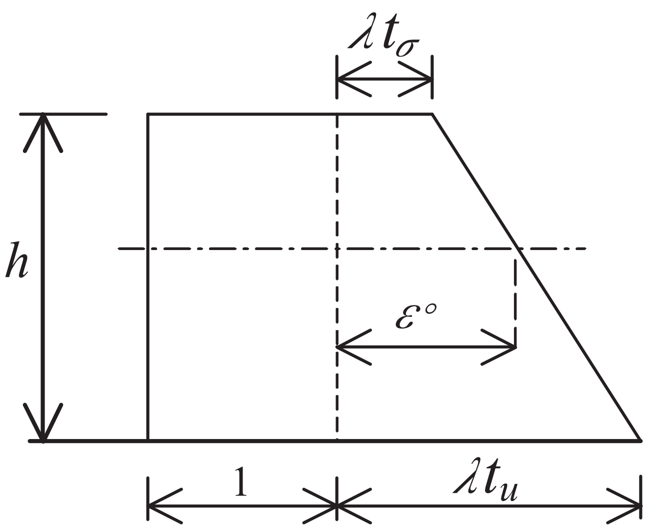

Fig. 2.5. Linear change of temperature and the symbols used

Based on the geometry shown in Fig. 2.5, the curvature and elongation values shown in Eqs (14) and (15), respectively, are easily derived. Consequently, using Eqs (1)–(3), and (8)–(9), the results are shown in Eqs (16) and (17, are obtained), respectively. Finally, using Eq. (10), the important result shown by Eq. (18) is obtained. This means that when the temperature distribution is linear and all materials possess equal coefficient of thermal expansion, no internal forces or stresses are created in an internally and externally statically determinate structure, only deformations,

$$k_i^o = \frac{l(t_u - t_\sigma)}{h}, \tag{14}$$

$$\varepsilon_i^{\mathrm{o}} = \varepsilon^o + k_i^{\mathrm{o}} y_i, \tag{15}$$

$$\varepsilon = \varepsilon^o, \tag{16}$$

$$k = k_i^o, \tag{17}$$

$$\sigma_i = 0. \tag{18}$$

Conclusion

Strictly speaking, the first composite structures were created, when the use of reinforced concrete beams and slabs was started in the late 1800's. These structures, however, were never considered or analyzed as composite structures, and that is still the case today. The next step was two-folded: a concrete deck was cast on steel girders or a steel girder was imbedded into concrete. In the early 1900's these structures were widely used in building and bridge construction, respectively. The interesting thing is that they were never analyzed as a composite structure, although the composite action is obvious, as it was realized half a century later. To create a real composite action in girders, different connectors were developed and taken into use. These connectors, however, were laborious to install and created fatigue problems in steel mainly because of many lateral welds in the upper flange of the steel beam. A considerable improvement was achieved, when simple stud bolts with small welds around the stud shaft and great working efficiency were developed and taken into use in the 1960's. Another problem was the creep of concrete that diminished the efficiency of the composite action as well and caused cracks in the concrete deck slab in the negative moment regions. The method to tackle those problems was to prestress the girder either by lifting it during the casting phase or by using prestressing tendons. Consequently, a girder with four different materials was created, and the theoretical studies and practical analyzing methods, developed by Sattler, Hawranek, Steinhardt, Fritz and others, could be utilized. Later, in the 1990's, also other types of composite structures were developed, for instance wood-concrete composite girders. The same theoretical analyzing methods are valid for them, too. The present author was strongly involved with that developing work and found it useful to extend the theory of composite structure analysis to cover all kinds of materials. Consequently, the generalized theory for shrinkage and change of temperature analysis of composite cross-sections presented above was developed. At the same time, it was worth of modifying the relatively complicated notations used by the earlier researchers. By this way it is hoped that the understanding of the theory itself becomes clearer as well. Finally, as it can be seen from Eqs (8), (9) and (10), only three simple equations are needed to cover all possible cases for the analysis of a composite girder consisting of any amount of different materials and different types of cross-sections.

ACKNOWLEDGEMENTS

The paper is devoted to two of the author's good Hungarian friends and colleagues, Professors Dr. Géza Tassi, and Dr. Miklós Iványi, who always supported and encouraged the author in professional and private life endeavors. That would certainly be the case now as well, if they were aware of this paper.

Furthermore, the author's sincere thanks also go to Professor Dr György L. Balázs and the author's former PhD student, emeritus Associate Professor, Dr. Bertalan Szabó, both from Budapest University of Technology and Economics, for their encouragement and assistance during the writing process of the paper.

TRIBUTE 3 INTEGRATING EXPERIMENTAL STUDIES IN STRUCTURAL STEEL RESEARCH AND EDUCATION

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Preface

Prof. Dr. Miklós Iványi has made profound contributions to modern structural steel engineering research and education in Hungary as well as internationally. The author had the privilege to be his doctoral student, colleague, and friend, while working with him for two decades. This paper presents the significance of experimental investigations in steel research and education through Dr. Iványi's achievements and is dedicated to his memory. During his career spanning 50 years, Dr. Iványi was instrumental in building strong, internationally integrated educational programs at two Hungarian universities and achieved world-wide recognition. He instilled in his students the appreciation for experimental investigations, which is fundamental to understanding material and structural behavior, and is indispensable to the development of improved computational models that modern steel design increasingly relies on.

Introduction

Prof. Dr. Miklós Iványi's overarching scientific work can be best characterized by synthesizing subject areas of plasticity, stability, and structural design theories, even though he also achieved significant results in every one of these areas individually. Building on the legacy of his professor, Dr. Ottó Halász, he established world class steel design education and research programs at Budapest University of Technology and Economics (BUTE). During his 40 years tenure at BUTE, Dr. Iványi served as professor, department head, and vice-rector, as well as head of the research group of the Hungarian Academy of Sciences at BUTE. He spent the last ten years of his career at University of Pécs, where he had a key role in establishing the BSc program at the Faculty of Engineering and Information Technology, and served as one of the heads of the Marcel Breuer Doctoral School.

The numerous research projects Dr. Iványi conducted at BUTE, most with a substantial experimental component, led to international research cooperation, creating unique opportunities for his graduate students.

Research programs

Dr. Iványi's major area of research was on the stability and ductility of steel frames and steel plated structures with stiffeners. The Hungarian Scientific Research Fund (OTKA) and various international programs (e.g., TEMPUS, COST) sponsored several research projects in this subject area. The ductility of the structure enables prediction of the ultimate capacity of structures, which are the most important criteria in the design of structures. Initial research focused on the development of ductile details for steel construction and rigorous requirements were enacted to make stability-related failures as ductile as possible or to avoid them all together. Material, member, and structural (semi-rigid connections) ductility is required in the design for ductile response. Therefore, eventually, the research concentrated on how the load-displacement curves of steel frames can be constructed as exactly as possible with the ductility, or how the limit load can be, using approximate methods, estimated with the softening phenomenon. An example [1] for a simple structure is described in Fig. 3.1. Presently, continuing in the same direction, more advanced methods for damage modeling are developed.

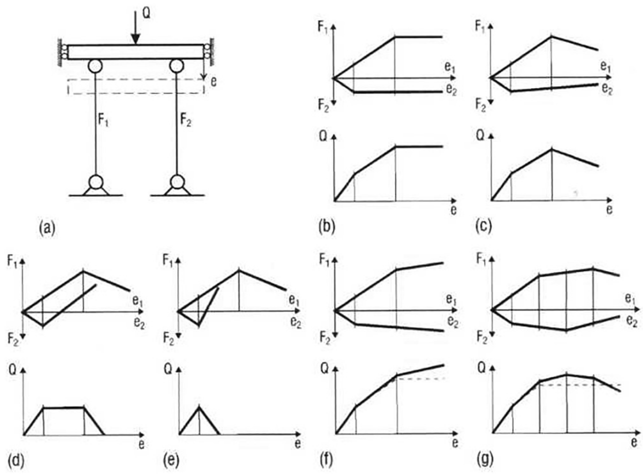

Fig. 3.1. Behavior of a simple structure

Dr. Iványi suggested early on a procedure that takes into account the softening character of the inelastic hinge in the form of an interactive zone [2], see Fig. 3.2, in which the softening is caused by the buckling of the component plates and can be studied through the yield mechanism.

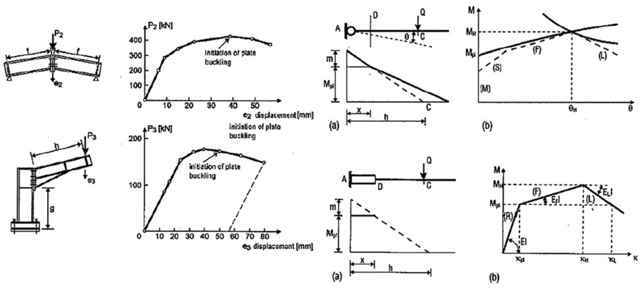

Fig. 3.2. Experimental study of steel frame joints (left) and proposed models (right)

A unique device available at the structural testing laboratory of BUTE that Dr Iványi cherished, was a gravity load simulator [2, 3], that enabled testing of sway frames under simultaneous lateral and vertical loading with minimal load-structure interaction (Fig. 3.3).

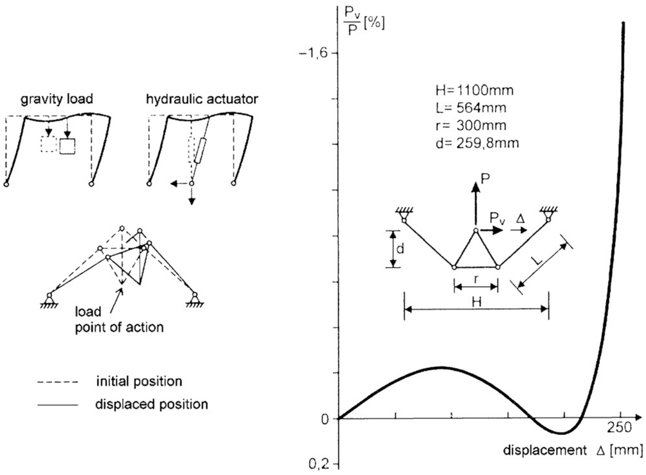

Fig. 3.3. Gravity load simulator and its behavior

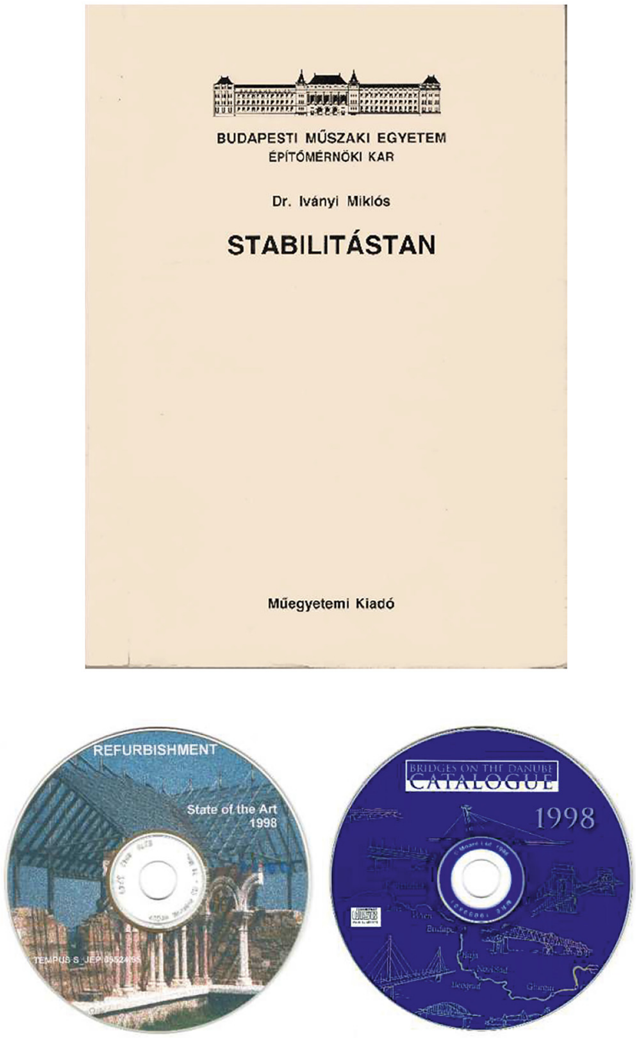

Fig. 3.4. Structural stability textbook (top), Refurbishment CD (bottom-left), and Bridges on the Danube catalog CD (bottom-right)

Educational programs

The extensive theoretical and experimental work conducted in the laboratory of BUTE resulted in 40 scientific books and more than 220 scientific papers. The author assisted Dr. Iványi with the digitization and creation of multimedia editions of some of his publications, like the Structural Stability textbook, which was used in the distance learning program at BUTE, and the Refurbishment multimedia CD, which is used as a reference material in the refurbishment of structures course at Metropolitan State University of Denver, see Fig. 3.4.

Dr. Iványi's unequivocal love of bridges is well reflected by the CD-based catalog of the Danube bridges he edited, shown in Fig. 3.4. This was also evident during our joint travels within the United States on our way to the North American Steel Construction Conferences, when we had the opportunity to visit bridges, the Tacoma Narrows Bridge, WA, the world's highest, the Royal Gorge Bridge, CO, and maybe the most iconic, the Golden Gate Bridge, CA, shown on Figs 3.5–3.7, respectively.

Fig. 3.5. At the Tacoma Narrows Bridge, WA, 2002

Fig. 3.6. At the Royal Gorge Bridge, CO, with Dr. Z. Balogh and Dr. A. Iványi

Fig. 3.7. At the Golden Gate Bridge, San Francisco, CA, 2004

It was always a great pleasure traveling with Professors Amália and Miklós Iványi. His international stature was clearly recognized by the profession everywhere in the US. Besides being involved with national and international professional organizations and several top international journals, Dr. Iványi was the main organizer or member of the advisory board of more than 30 international conferences. One particularly memorable conference, organized by the Structural Stability Research Council, where Dr. Iványi was the Chairman of the International Co-operations Task Force, and the American Institute for Steel Construction, was held in Seattle, WA, in 2002, see Fig. 3.8.

Fig. 3.8. NASCC reception at the Boeing Museum of Flight, CA, 2002 with Dr. Z. Balogh, Dr. A. Iványi, and Dr. T. Galambos

Acknowledgements

Prof. Dr. Miklós Iványi was instrumental in establishing the framework of the institutional cooperation between the author's institution, Metro State University Denver, and University of Pécs.

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TRIBUTE 4
PROFESSOR MIKLÓS IVÁNYI: AN APPRECIATION

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In 1978, after completing a PhD in London, I was appointed Lecturer in Civil Engineering at Edinburgh University. It was shortly after my arrival in Edinburgh that I became aware of the engineering research activity in Hungary. It was apparent that there was one renowned researcher in Hungary, with a world class reputation, and that was Professor Miklós Iványi, whose research field did have some potential links with that of my own. I had an interest in structural optimization and steel structures provided a perfect research area. On leaving Edinburgh University to take a post at Heriot-Watt University, Edinburgh, in 1988, I resolved to try and make contact with Professor Iványi. In November 1989, the Berlin Wall came down and a period of "change" occurred. Before I could contact Miklós, I received a letter from a Hungarian student asking if he could complete his Diploma project with me in Edinburgh. He was to be funded as a "free mover" by the European Commission and stay for six months. More interestingly, he was also "a student of Professor Miklós Ivanyi".

The student, Janos Sziveri, spent eight months working on a project concerned with computer programming and structural analysis. During his stay he spoke fondly of his professor and described how Miklós had lectured during his final year on the structural analysis of the Holy Crown of Hungary. I wondered if he had done so before the period of "change" occurred. I was further intrigued by this and Janos' obvious enthusiasm. So, after Janos returned to Hungary, at long last, I made a visit, funded by The British Council, to meet this "Hungarian Professor who had an international reputation" in the days before the "change" and long before Hungary joined the European Union.

The first meeting with Miklós, held in his office overlooking the Danube in Budapest, was relevant to my interests in MSc Courses and PhD research in structural engineering computing. On my return to Edinburgh I successfully applied for funding for Janos Sziveri to undertake his PhD in Edinburgh. Then Miklós sent his son, Peter, for two summer research visits. At the time, the main focus of my research group was on the use of multiple processors for the analysis and design of structures. The early processors were difficult to programme with inter-processor communication only possible using four simple serial links for each processor; but Peter and Janos managed to get the processors to work. Janos stayed with my research group for six years and Peter for seven years. Other students and staff visited from Miklós' department at various times.

Academic performance is usually on a very personal basis with academics competing for funding, students and staff. By contrast, Miklós was very generous and altruistic; his personal support and encouragement was extremely important to me and my research group. It was clear to me that he saw computing or information technology as the future. I was a regular visitor to attend meetings that Miklós organized in Budapest. In 2000 Miklós and I edited a volume of Conference papers concerned with computational steel structures. As usual, it was a great pleasure to work with him.

In 2004 Miklós moved from Budapest to Pécs, following his wife, Professor Amália Iványi, who had moved to Pécs in 2003. In particular, I remember an early visit and a long discussion with Miklós and Professor János Bársony to discuss engineering education in PhD studies. I attended the first PhD Symposium, a series which he established in 2005, and have been visiting the Faculty every year now for over twenty years. At the third PhD Symposium, Miklós proposed that I should be made Honorary Professor in the Faculty. Then in 2011, I was awarded an Honorary DSc and made an Honorary Professor by the University. So personally, I owe Miklós a great debt.

In 2006, Miklós established, with Professor Amália Iványi, the International Journal for Engineering and Information Sciences, Pollack Periodica. This complemented the PhD Symposia perfectly. He greatly improved the environment and infrastructure for PhD research in Pécs. So, we all owe him a great debt.

Sadly, we lost an outstanding teacher and researcher in 2013. I lost a mentor and a great friend who had shown me so kindness and supported me in many ways that enhanced and enriched my life and career. I think those who had experience of Miklós Iványi, in their professional life, will remember him as enthusiastic, hardworking, kind and generous. So, it is important and right that we continue to remember and salute him by continuing to name the Pécs PhD Symposium after him. In doing so, we continue to recognize all that he did for engineering education and research both in Hungary and internationally.

TRIBUTE 5
THE MEMORY OF PROFESSOR IVÁNYI IN THE ACADEMIC LIFE OF THE FACULTY OF ENGINEERING AND INFORMATION TECHNOLOGY AT UNIVERSITY OF PÉCS

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Professor Iványi came to Faculty of Engineering and Information Technology, University of Pécs from the Budapest University of Technology and Economics in 2004. He was the one who finally gave a face to the PhD training curricula of the Doctoral School when its framework was expanded. But he was also the first among the flag bearers at the birth of the master-level civil engineering training program. These two fields have grown to a broader spectrum related to science and technology in construction. I can say that after the years, we pay tribute to the efforts of this period.

Professor Miklós Iványi lives in my mind as one of the great professors of the Faculty, who at the same time, in the same place, invented the modern 'Pollack', Mihaly Pollack College of Engineering. I imagine that they met in the early twenties – Bachman, Kistelegdi, Hübner, Tóth, Kukai, Mecsi, Bársony, Ásványi the Iványi Family Mrs. and Mr. Iványi – and there was much talk, beyond the friendly conversations, about what might the platform be of the academic side of technical higher education in Pécs. Do not forget we were directly after these changes, the introduction of the credit system and Bologna systems, and our Faculty was a classical college.

This was a real task, as at that time, the 'Pollack' was closer to a high-level design company than a science platform since the more significant part of the Colleagues and Teachers were practicing and well-prized engineers but not scientific researchers. It was clear that the future lay in becoming a so-called 'classical academic' faculty, not a college, rather a 'university faculty,' which was also the basic principle of the newborn (reborn) University of Pécs, after integrating several independent schools and universities in higher education -including the 'Pollack' also.

The conversations led to the concept with the main pillars: a local international scientific conference, a local international publication platform, and the doctoral-level training program. In 2004, only the Doctoral School existed.

Finally, the professional scientific journal, under the name of 'Pollack Periodica,' was founded by Professor Miklós Ivány at the Faculty of Engineering. At first, it consisted of small booklets, while now it is now maintained by Akadémia Publishing as an open-access platform for scientific publications. Today, it is one of the Q3 journals of the University of Pécs, with publications and citations from all over the world. Today, the Pollack Periodica is edited by Miklós Iványi's beloved wife, Prof. Amália Iványi. She has been tirelessly and consistently maintaining the journal to a high standard for many years, and the community of the Faculty is very grateful for her work.

The other stronghold in the concept of 2004 was the 'International Scientific Conference,' which is now the 19th in a row, just today. It was specifically intended to fill the gap that seemed to exist around young researchers aspiring to a doctorate, offering them a platform to learn about each other's work and research and to connect their work to networks at the international level. Indeed, over the years, the Symposium has become the Faculty's most prestigious international periodic event. Today, the Symposium is organized by Professor Iványi's son, Péter Iványi, full professor and Head of Department at our Faculty, keeping traditions and objectives set.

Since 2013, when he left us, this conference has been named after Miklós Iványi.

Professor Iványi's work in his last ten years here in Pécs has indisputably left a mark on the scientific environment of technical education that we, the successors, take seriously and cherish with great respect.