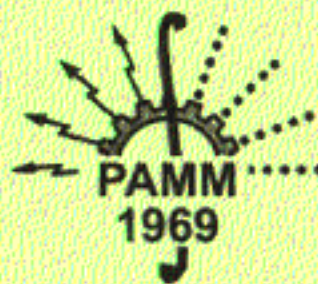


**MONOGRAPHICAL BOOKLETS
IN APPLIED & COMPUTER MATHEMATICS**

*Pannonian
Mathematical*



*Applied
Meetings*

Interuniversity Network in Central Europe

Edited by F. Fazekas

MB-15 / PAMM

**THE EULER SYSTEM FOR THE ALGEBRAIC
NUMBER THEORY
&
MATHEMATICAL MODELS IN POLLUTION**

Written by

Malvina BAICA

University of Wisconsin - Whitewater USA

Caretaken by the PAMM-Centre

at the

Technical University of Budapest

BME

1782

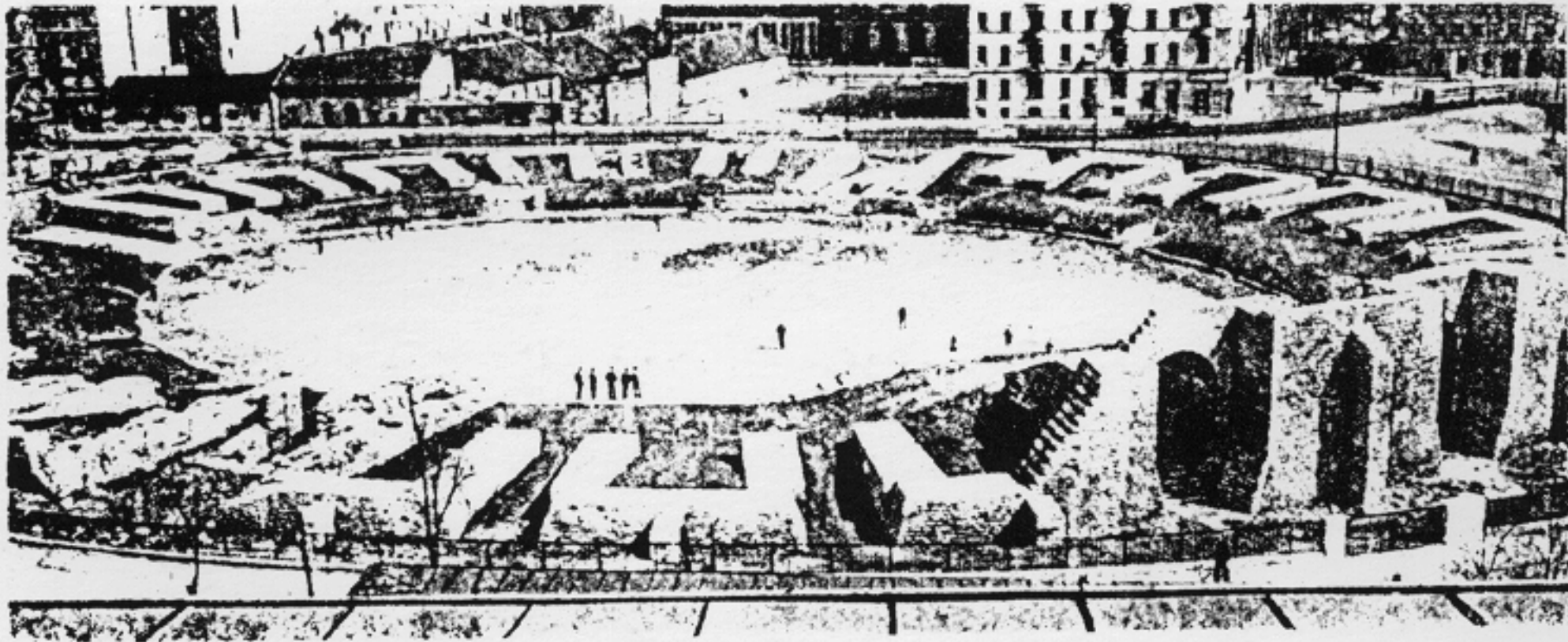
BUDAPEST

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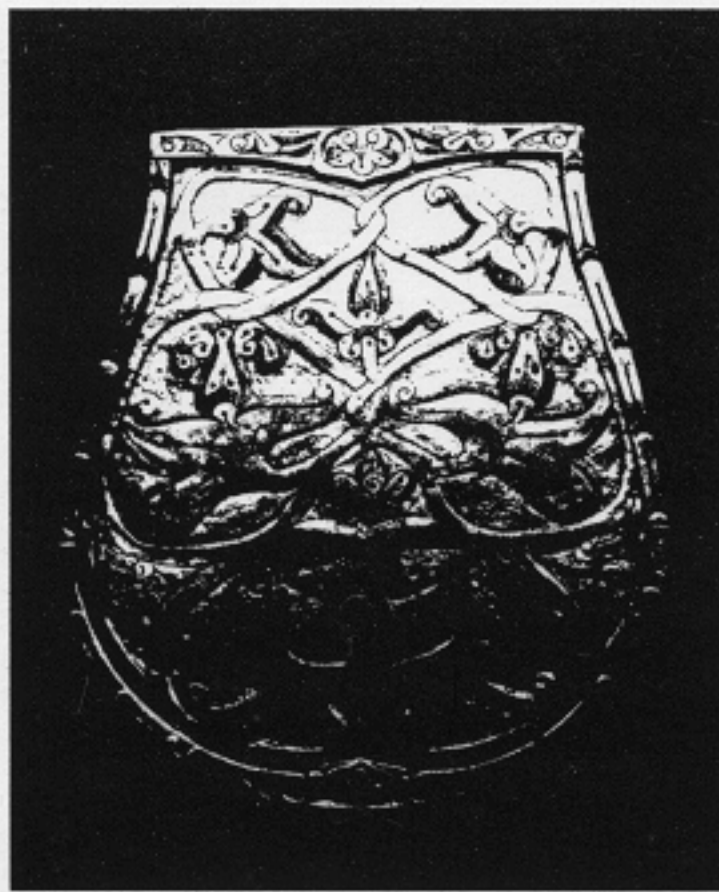


"P. dictus magister, ... *Belae regis notarius*" (*Anonymus*) had written (about 1200, in Latin language) in his "*Gesta Hungarorum*" (Chapt. 46.): Next day, *Prince Arpad* and all his prime men, together with all valiance of *Hungary* marched into *King Attila's city*, ... , without war, ... ; the Prince originates from the King's descendants."

* The *Military Amphitheatre* of *Pannonia's* capital *Aquincum* (being now in ruins on area of *Budapest*, see figure).

This series *MB / PAMM* is started

in the *Millecentenary Jubilee Year of the Hungarian Conquest*, in the Danube Basin
(896-1996)



Many thanks to the
S p o n s o r s ,

whose priceful assistance to this series *MB / PAMM* created the possibility to realize these volumes for the engineers, researches and scientists of Panno-Danubian countries. The PAMM is hoping and asking for the aiding cooperation of such Establishments.

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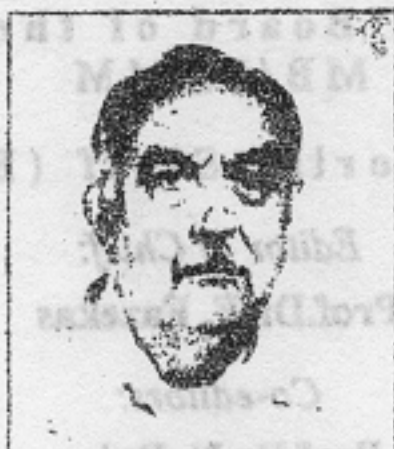
**MONOGRAPHICAL BOOKLETS
IN APPLIED & COMPUTER MATHEMATICS**

PAMM

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Aquincum**

**Zeus
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**Editor-
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**Prof. Dr.
F. FAZEKAS**

MB-15

**Timisoara
(Ts)**

**THE EULER SYSTEM FOR THE ALGEBRAIC
NUMBER THEORY
&
MATHEMATICAL MODELS IN POLLUTION**

**Belgrade
(Bg)**

**Košice
(Kš)**

Author:

Prof. Dr. Malvina BAICA

University of Wisconsin – Whitewater
USA

**Cluj
(Cl)**

**Rijeka
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**Novi Sad
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Caretaken

by the PAMM-Centre at the TU-Bp

**Maribor
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BUDAPEST, 2000

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The request of the enlisted colleagues happened partly personally, and is continued partly by mail.

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"Influence, create, increase! The country clears to light."

("Hass, alkoss, gyarapíts! A haza fényre derül." - Kölcsey F.)

Preface to the series MB

Lectori salutem! The kind reader begins to study the first volume of a new series. Worthy to look at the *present circumstances* of this starting: a) the series MB with matters b) from the *Applied & Computing Mathematics* (ACM) is starting onto its way c) just in the *Millecentenary Year* (MCY) of the *Hungarian Conquest* (HC) in the *Danube Basin* (DB), d) by our Pannonian society PAMM e) having its *Centre* at the *Technical University* of Budapest (TU-Bp), f) namely as *Interuniversity Network* (IN) in Central Europe g) at my Editor in Chief's (ECh) activity and h) printed by the *Publisher* of (TU-Bp). These brought along - inevitably - the mentioned *starting* and will yield - hopefully - the birth of many booklets till the *Millenary Year 2000* of the *Hungarian State* too.

Useful to consider the *past circumstances* of the 28 years old life of PAMM: a) its rich *working experiences*, b) the professional-amical *cooperation* in its suitable frame IN by *engineers-mathematicians* etc. c) arrived mostly from the DB's *universities* of technics and sciences, d) the PAMM's periodical "*Bulletins for Applied Mathematics*" (BAM) with its 1200 papers in 79 volumes from about 2800 lectures of 116 Conferences (PC), e) the *Pannonian traditions*, e.g. the pleasant, friendly, useful, thinking, creative, mobil lifestyle, f) the cultural-scientific *impressions* obtained in the PC's *Hungarian cities* and universities (e.g. Bp, B.füred, B.almádi, Göd, Veszprém, Miskolc, Debrecen, Szeged, Pécs, Sopron, Győr, Baja etc.), g) similar and greater impressions in the PC's *European ones* (e.g. Kosice, Krakow, Wien, Belgrade, Rijeka, Trieste, Cluj, Timisoara, Istanbul, Athen, Roma, Paris, London, etc.), h) on these traces, the PAMM's international "*foreguard*" (with young professors and colleagues) and its international "*governing board*" (in numerous committees, with respected rectors, deans, directors of inst, professors) as *motors* of planning and acting in the PAMM's multilateral life etc. After such precedents, it was *almost natural* - in this festive MCY still better - the starting of MB, namely *beginning the* authorial works for about 26 *initial volumes* at my ECh's activity (with earlier experiences from the series "*Practice in Engineering Mathematics*" (PEM in 23 vol., 4 edit./vol.) and from the periodical BAM in 79 vol. etc.).

Of course, *the MB's purpose* is drawn clearly. Each booklet must intend a) to give a *survey* - in the present situation of the ACM's special (scientific) literature - *on the small domain* choosen by the author, b) to build in *the author's scientific results* got in these domain (e.g. new theorems or developments, recent methods or algorithms for known tasks etc.), c) *numerical examples and computing ones*, possibly with programmes, d) to show *various applications* of this ACM-domain in the modern technical, physical, economical, biological, medical etc. sciences. Obviously, there is talking about *scientific booklets* for special experts, but *not about ordinary lecture notes* for graduate students.

For which readers are recommend these booklets? It follows from the former purpose, that these are written and proposed for *dipl. engineers, physicists, economists, biologists, physicians*, moreover for *such doctorands, postgraduates, lecturers*, occasionally for *eminent graduate student* too.

This reading public wishes really *various mathematics applied in technics, physics, economics, biology, medicine* and *counted* in such tasks by *computers* at their rich languages and programmes. These public *respects the pure mathematics, but utilises them only together with applications and computers*. - *Our PAMM-authors* - working in various countries, cities, universities, faculties, branches - *will produce generally a balancing* among the mathematical, computer and applying (e.g. technical) sciences, but some booklets will be made - occasionally - with an *overweight* of one side from the triangle ACM. Obviously, such medial and extremal booklets *can occur* alike in a such series. Only *the enthusiasm of this interuniversity professional cooperation* is the sole common property of our PAMM-authors and just the same one *promises useful reading matters* for you, kind Reader! If you *find* so at this volume, that our former promise is fulfilled, please, *read* our following booklets too!

Necessary to express our *best thanks* to *Sir Vice Rector Prof. Dr. G. Gordos* for his excellent assistance to buy and develop the *PAMM's Computer System* and to starting of these series MB, moreover to *Sir Dean Prof. Dr. J. Zobory* for his durable aiding to open and furnish *the new, separate PAMM-Centre*, just the *birthplace* of the series MB.

Vale, noster Lector and Collegal! Farewell is nodded friendly for you by the ECh:

Budapest - Göd, 12th October 1996

Prof. Dr. F. FAZEKAS

Autobiography of Francis Fazekas (in 1997)

Birth: 1922, Csenger. - Middle schools: from 1933; final exam.: 1941. - Technical University of Budapest (TU-Bp): from 1941; Dipl. Mech. Eng.: 1947.

From 1948 up to date: activity at TU-Bp; Dept. of Math.: assistant, sen. lecturer, associate professor, since 1983 senior researcher scientific (also today). From this year, the head of PAMM-Centre at the Dept. of Transp. Automatics.

dr. tech: 1965, TU-Bp; Dr. Math. Sci.: 1968, U-Novi Sad.

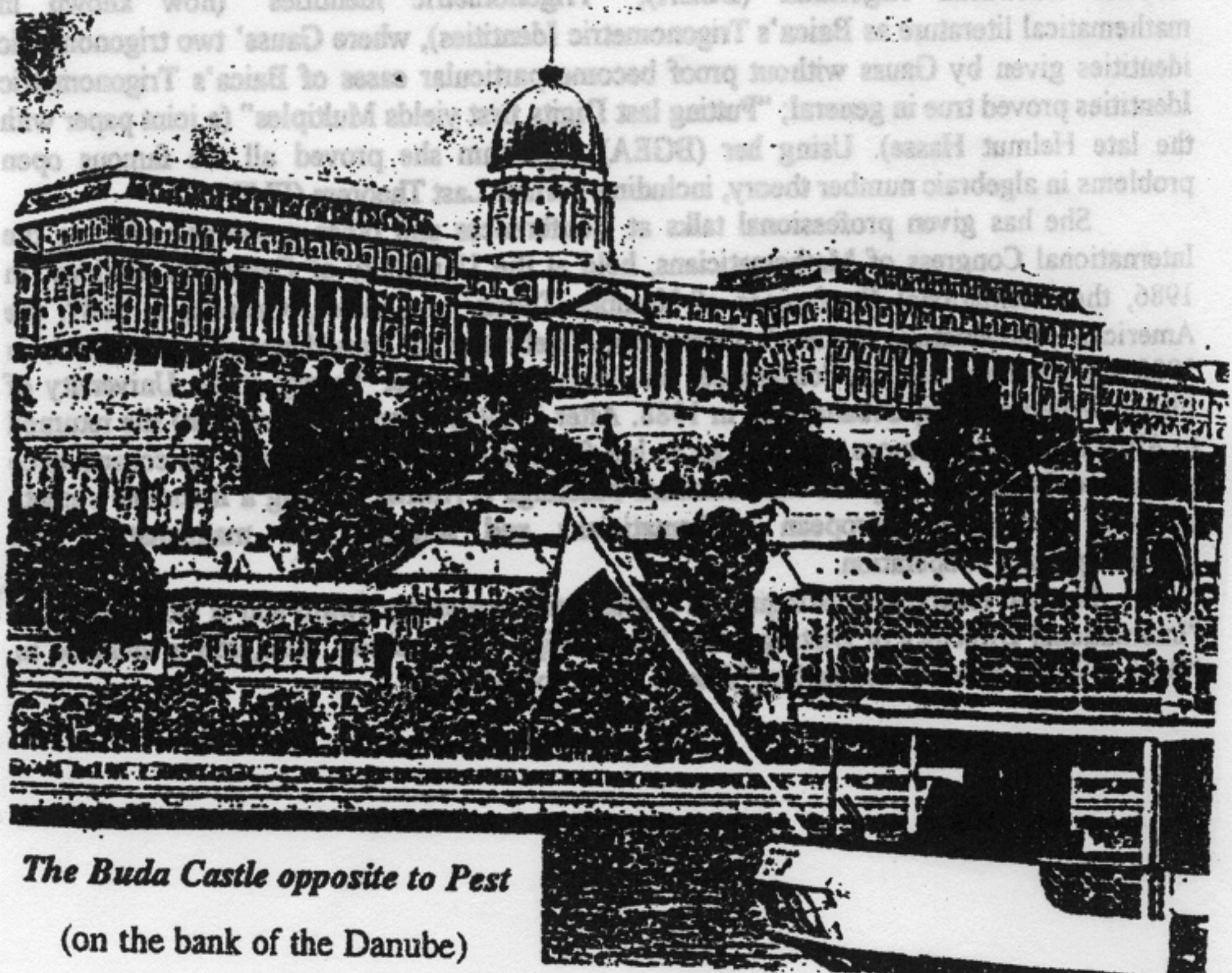
Travels in Europe (to conferences, with lectures) till now: about 55 (e.g. Bruxelles, Aachen, Zürich, Moscow, Wien, Prague, Weimar, etc.).

Pannonian Appl. Math. Meeting (PAMM), founded by me in 1969; till now 118 Conferences, whose 28 in foreign countries (e.g. in Belgrade, Istanbul, Athen, Roma, Paris, London, etc.).

Publications, mostly on matrix methods, diff. equations, dyn. systems, stochastics, diff. geom.: about 150 papers (in ZAMM, ISNM, KF, BAM etc.); about 15 univ. lecture notes & bulletins. - Editor of Practice Eng. Math. in 23 vol., mean 4 edit./vol., till 1980; from these 10 vol. written by me. - Editor of PAMM's Bull. of Appl. Math. (BAM) since 1971; till now 80 vol. with 1300 papers.

- Editor in Chief of PAMM's MB, started in former year, beginning the authorial works for 26 volumes and publishing quickly 2 booklets, then newer 2 ones in this year from them too.

Decorations: Memorial Medal from TU-Kosice (1994), and from TU-Bp (1997, Summer), Honorary Diploma from U-Novi Sad (1997), "Golden" Diploma from TU-Bp (1997, Autumn) etc.



*The Buda Castle opposite to Pest
(on the bank of the Danube)*

Supervisor of MB-15: *Richard Schauer*

BIOGRAPHY OF MALVINA BAICA

The wife of Adrian Baica and daughter of Adam (a lawyer) and Comelia Bunghiu, Malvina Florica Baica was born in Oravița, România, on the 3rd of November 1942. After gaining her baccalaureate at Oravița Lyceum in 1960 she spent five years at the University of Timișoara, earning a BS in Mathematics and Physics (mechanics) and an European MS in Mathematics (Projective and Differential Geometry). She taught for two years, but subsequently emigrated, with political asylum to the United States. Resuming her studies she was awarded her MA in Mathematics (Algebra and Number Theory) by Illinois Institute of Technology of Chicago in 1974 and her Ph.D. in Mathematics (Algebraic Number Theory and Algebra) by the University of Houston, Texas, in 1980. Her Ph.D. advisor was Jürgen Schmidt and her Ph.D. dissertation advisors were Helmut Hasse and Leon Bernstein.

Since 1992, Professor of Mathematics and Computer Science at the University of Wisconsin – Whitewater, Dr. Baica joined the academic staff there in 1984 as a lecturer, and was appointed assistant professor the following year. She had previously held positions as assistant professor at Marquette University (Wisconsin), Marshall University (West Virginia) and Valparaiso University (Indiana).

Her research results were published by reputable journals in more than 30 papers.

Among her publications the most significant are "An Algorithm in a Complex Field (ACF) and its Applications to the Calculations of Units" (which is a new and very powerful algorithm, which turned out to be the General Euclidean Algorithm) known as Baica's General Euclidean Algorithm (BGEA); "Trigonometric identities" (now known in mathematical literature as Baica's Trigonometric Identities), where Gauss' two trigonometric identities given by Gauss without proof become particular cases of Baica's Trigonometric Identities proved true in general; "Putting last Digits first yields Multiples" (a joint paper with the late Helmut Hasse). Using her (BGEA) algorithm she proved all the famous open problems in algebraic number theory, including Fermat Last Theorem (FLT).

She has given professional talks at Conferences and other meetings including the International Congress of Mathematicians, held at the University of California, Berkley, in 1986, the International Conference of Number Theory in Quebec, Canada, in 1987, the American Mathematical Society's Centennial Celebration in Providence, Rhode Island, in 1988 and the International Conferences on Analytical Number Theory at the University of Illinois, Allerton Park, Urbana, also in 1988. After 1989 (Romanian Revolution) she returned to Alma Mater giving more conferences on her favorite subjects in România. As consequence she joined Pannonian Applied Mathematical Meetings (PAMM), finding a favorable climate to meet prestigious European mathematicians and scientists for mathematical and interdisciplinary cooperation.

She had received a distinguished professional leadership award and is included in the "International Directory of Distinguished Leadership", third edition. Also, she is included in "Who is Who" International and in "Who is Who" for Women.