Директору Математичког института САНУ Проф. др Зорану Огњановићу
Научном већу Математичког института САНУ
академику Драгошу Цветковићу

Стручни извештај о учешћу у

The 9th International Workshop

Computer Algebra Systems in Teaching and Research (CASTR'2017) , Siedlce, Poland, October 18 – 22, 2017.

http://www.castr.uph.edu.pl

Mini-symposium on Computational Aspects of Classical and Celestial Mechanics, Stability and Motion Control is organized in the framework of the workshop

Invited organizers of Mini-symposium:

Pavel S. Krasilnikov (Moscow, Russia),
Katica R. (Stevanovic) Hedrih (Belgrade, Sera),
Alexei A. Tikhonov (St. Petersburg, Russia)

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Siedlce University of Natural Sciences and Humanities (Siedlce, Poland)
Warsaw University of Life Sciences - SGGW (Warsaw, Poland)

Поштовани директоре, Професоре Огњановићу,
Поштовани председниче, Професоре Цветковићу,
Цењени чланови Научног Већа МИ САНУ,

У периоду од 18 до 22 октобра 2017, боравила сам у Пољској, у Седлицама и учествовала сам у научном програму деветог интернационалног научног скупа под називом:

The 9th International Workshop

Computer Algebra Systems in Teaching and Research (CASTR'2017) , Siedlce, Poland, October 18 – 22, 2017

http://www.castr.uph.edu.pl

чији су организатри: **Siedlce University of Natural Sciences and Humanities (Siedlce, Poland) и Warsaw University of Life Sciences - SGGW (Warsaw, Poland).**

Ја сам учествовала, по позиву, као један од организатора минисимпозијума под називом:

Mini-symposium on Computational Aspects of Classical and Celestial Mechanics, Stability and Motion Control is organized in the framework of the workshop

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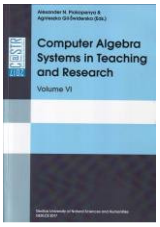
а и као члан научног комитета научног скупа **CASTR'2017.**.

Као прво предавање Мини-симпозијума, из Класичне механике, по позиву организатора, сам одржала 45-минутно предавање које је било најављено под насловом:

Hedrih (Stevanović) Katica

Generalized rolling pendulum along curvilinear trace: Phase portrait, singular points and total mechanical energy surface

и отштампано у целини у специјалном броју часописа



Hedrih (Stevanović) Katica, Generalized rolling pendulum along curvilinear trace: Phase portrait, singular points and total mechanical energy surface, Computer Algebra Systems in Teaching and Research, Edited by Alexander Prokopenya and Agnieszka Gil-Swiderska, Publisher Siedlce University of Natural Sciences and Humanities (Siedlce, Poland), 2017, Vol. VI, pp. 204-216. ISSN 2300-7397. http://www.castr.uph.edu.pl

У оквиру предавања ја сам говорила и о мојим оригиналним резултатима, који су формлисани: **Extension of classical theory of impact by kinematics and dynamics of collision two bodies in rolling** и **Vibro-impact dynamics system of two rolling bodies along curvilinear trace.**

После предавања ми је постављено неколико питања, а и у паузама конференције поједини учесници су се интересовали за хипотезу о конзервацији суме момената количине кретања тела у котрљању пре и после судара , коју сам увела, као и за моју нову дефиницију коефицијента реституције израженог помоћу угаоних брзина котрљања тела у судару, пре и после судара, као и за моје формуле одлазиних угаоних брзина после судара тела у котрљању. Предавање је добро прихваћено и јако сам задовољна ефектом одржаног предавања.

На отварању научног скупа, позвана сам да кажем једну беседу у име организатора Минисимпозијума, после главних организатора продекана факултета професор др Агнешке Прусинске, и професора др Александра Прокопење, као професора др Роберта Крагера.

Првог дана научног скупа прво предавање, у трајању од 45 минута, је одржао проф. др Роберт Крагер, а саопштења су била посвећена компјутерским алгенарским системима. Предавање проф. др Роберта Крагера,са Weingarten University of Applied Sciences, је било под

селећим насловом: *Branch Cuts and Branch Points for a Selection of Algebraic and Transcendental Functions.* Ако у Математичком институту САНУ има заинтересованих за садржај овог предавања, могу презентацију и изворне фајлове у програму Wolfram-овој "**Mathematica",** добити од мене, јер ми их је предавач дао за промоцију. Садржај овог предавања сматрам интересантним и савременим за даља истраживања.

Другог дана секције су биле посвећене Класичној механици и небеској механици. Моје предавање је било прво и у трајању од 45 минута. Остала сопштења су била у трајању од по пола сата или 20 минута са дискусијом. У овом делу, председавала сам једном сесијом, као један од организатора Минисимпозијума.

Од двојице учесника овог научног скупа, из Јапана: *Hinoto Yonemitsu u Hideyo Makishta* добила сам публикацију под насловом: *"WASAW" Basic problems and solutions – Geometric Constructions with Cinderella and* K_E*TCimdy*. Ако у МИ САНУ има заинтересованих за садржај ове публикације, могу им дати исту на увид.

У наставку Извештаја, дат је један број прилога из којих се може видети програмска структура научног програма Конференције.

С поштовањем и захвалношћу директору, председнику Научног већа МИ САНУ, као и члановима Научног већа који су гласли за подршку пројектним активностима пројекта ОН174001 у периоду 2011-2017,

У Београду, 3.11.2017.

Катица (Стевановић) Хедрих

Проф. др Катица (Стевановић) Хедрих
Руководилац Пројекта ОИ174001
Динамика хибридних система сложених структура

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OF NATURAL SCIENCES AND HUMANITIES

Vice-Rector for Research

Mirosław Minkina
Associate Professor

Konarskiego 2,08-110 Siedlce tel:25 643 19 42,e-mail reknauka@uph.edu.pl; www.uph.siedlce.pl

Siedlce, 11 July 2017

Professor Dr
Katica R. (Stevanović) Hedrih
Department of Mechanics
Mathematical Institute SANU
Knez Mihailova st. 36/III
Belgrade, 11009 Serbia
khedrih@sbb.rs

Dear Professor Dr Katica (Stevanović) Hedrih,

On behalf of the Organizing Committee of the 8th International Workshop on Computer Algebra Systems in Teaching and Research (CASTR'2017) to be held in Siedlce, Poland from October 18 till October 22, 2017, we are glad to invite you to participate in the conference and to present your talk.

As an invited speaker you'll have 45 min. for presentation. We also expect that you'll agree to act as a Chairman at the mini-symposium on Classical and Celestial Mechanics.

Please note that the registration fee is 450 PLN. It covers organization expenses, conference materials and refreshment room at the Workshop. It can be paid on site upon arrival. Participants of the workshop CASTR'2017 will be accommodated at the UPH hotel situated in a walking distance from the Faculty of Science building, Zytnia str. 17/19, Siedlce, (http://www.uph.edu.pl/sprawy-studenckie/domy-studenckie).

We kindly ask you to confirm your participation by October 5, 2017 via e-mail: castr@uph.edu.pl and to let us know some details concerning your arrival and departure (number of train or flight, date and time). All the details concerning the workshop you can find on the website http://www.castr.uph.edu.pl

We look forward to seeing you in Siedlce.

Best wishes,

PROREKTOR DS. NAUKI
dr hab. Mirosław Minkina
profesor nadzwyczajny

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Siedlce, October 21, 2017

2017 C@STR
Computer Algebra Systems in Teaching and Research

Certificate of Attendance

This certificate is presented to

Katica R. Hedrih

For attendance at

CASTR'2017, 9th International Workshop on Computer Algebra Systems in Teaching and Research (www.castr.uph.edu.pl)

held in Siedlce, Poland, October 18 – 22, 2017

as invited speaker with the talk

"Generalized rolling pendulum along curvilinear trace: phase portrait, singular points and total mechanical energy surface"

Dr. Agnieszka Prusińska

Organizing Committee of CASTR'2017
University of Natural Sciences and Humanities in Siedlce
3 Maja str. 54, 08-110 Siedlce, Poland
Tel. +48 25 6431103
http://www.castr.uph.edu.pl

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Held in Siedlce, Poland, October 18 – 22, 2017.

Dr. Agnieszka Prusińska

Organizing Committee of CASTR'2017
University of Natural Sciences and Humanities in Siedlce
3 Maja str. 54, 08-110 Siedlce, Poland
Tel. +48 25 6431103
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Friday, October 20

3 Maja st. 54, Faculty of Sciences, 3d floor, Lecture Hall "Aula 303"

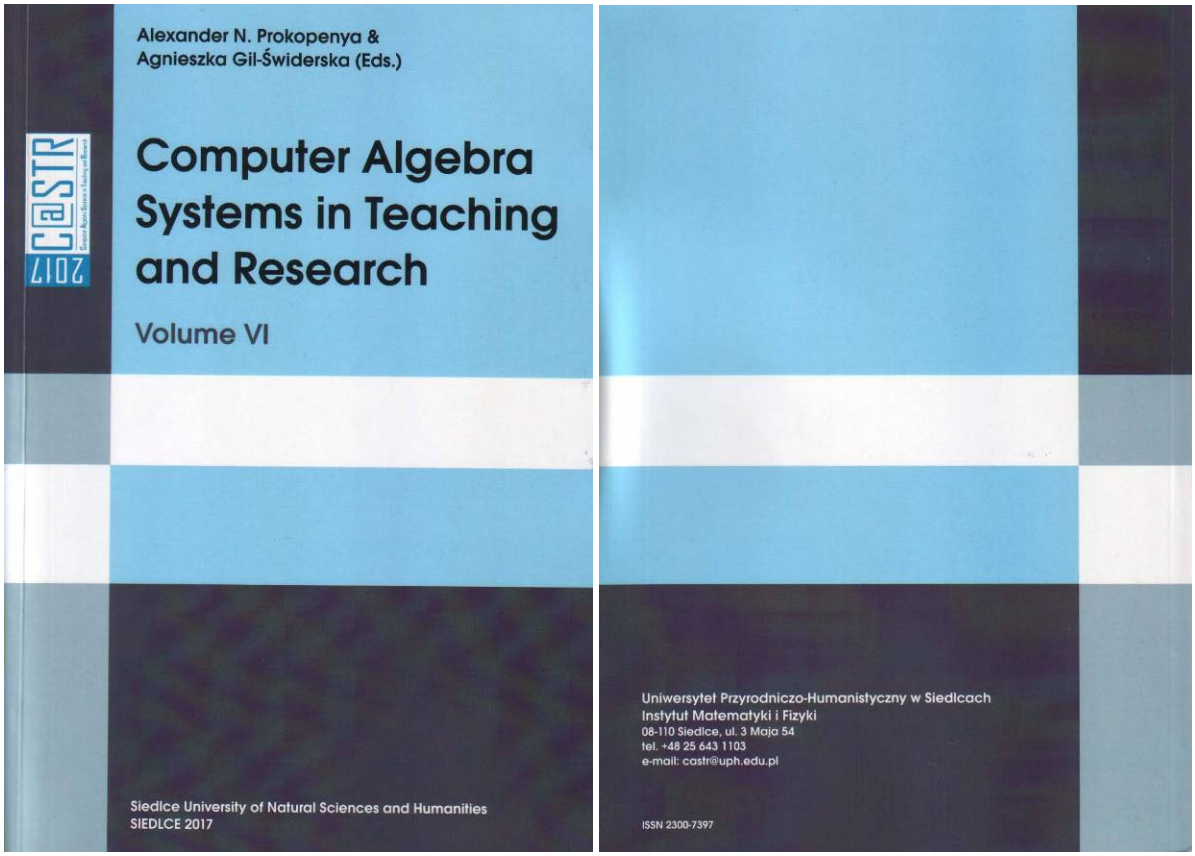
Mini-Symposium on Computational Aspects of Classical and Celestial Mechanics

Session Chair: Katica R. Hedrih

09:00 – 09:45 **Katica R. Hedrih**
Generalized rolling pendulum along curvilinear trace: phase portrait, singular points and total mechanical energy surface

09:45 – 10:15 **Boleslaw Radziszewski**, A. Szadkowski
Dynamics of a bouncing ball over a simple limiter in a viscous medium

10:15 – 10:45 **Pavel S. Krasil'nikov**
On explicit estimates of the accuracy in the averaging method



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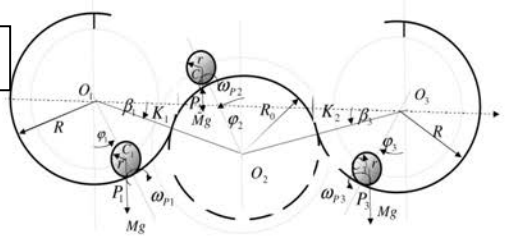
Једна од слика фазног портрета и површи укупне енергије динамичког система из садржаја предавања по позиву и публикованог рада у целини:

a*

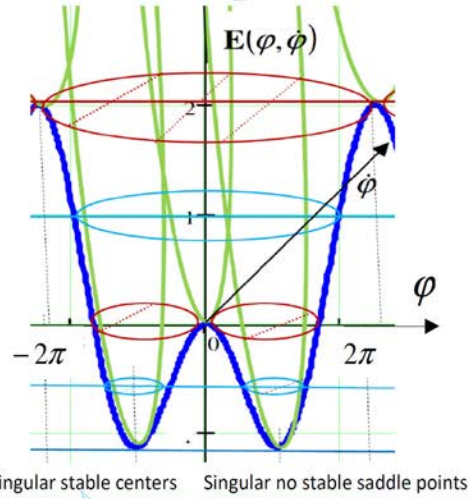


For $(R-r)>(R_0+r)-(R_0+R)\sin\beta$,

for $-\pi\le\varphi_1\le\frac{\pi}{2}-\beta$, $-\left(\frac{\pi}{2}-\beta\right)\le\varphi_2\le\frac{\pi}{2}-\beta$

and $-\pi\le\varphi_3\le\frac{\pi}{2}-\beta$

b*



Singular stable centers Singular no stable saddle points

c*

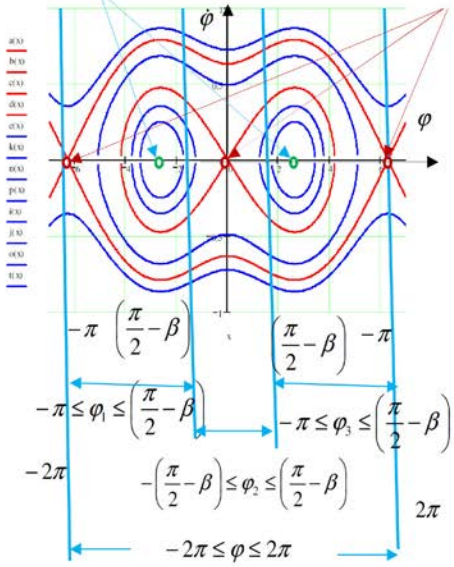


Figure 4. A generalized rolling pendulum with a rolling ball along curvilinear trace consisting of three circle arches each with central angle of $3\frac{}{2}-$ or -2 or $3\frac{}{2}-$, successively, and in the case for $(R-r)>(R_0+r)-(R_0+R)\sin$, for $-\le{}_1\le\frac{}{2}-$, $-\left(\frac{}{2}-\right)\le{}_2\le\frac{}{2}-$ **and** $-\le{}_3\le\frac{}{2}-$.

a* Mechanical model of "the generalized rolling pendulum" along curvilinear rolling trace.

b* Surface of total mechanical energy of the rolling dynamics of a ball along curvilinear line consisting of circle arches with central angles of $3\frac{}{2}-$ or -2 or $3\frac{}{2}-$, successively, in the singular case for $(R-r)>(R_0+r)-(R_0+R)\sin$ and with three maximum values of total mechanical energy, two same local maximum values of total mechanical energy and a smallest maximum value between previous, which correspond to three no stable saddle type singular points and two minimum of total mechanical energy values correspond to two stable centre type singular points;

c* Complete phase portrait of rolling dynamics of a ball along curvilinear line-trace consisting of three circle arches in the case for $(R-r)>(R_0+r)-(R_0+R)\sin$ and with a triggers of coupled each of three singular points and homoclinic orbit in the form of number "eight" with one cross section in one no stable saddle type singular point and with second type of homoclinic phase trajectory with two cross sections in two no stable saddle type singular points.

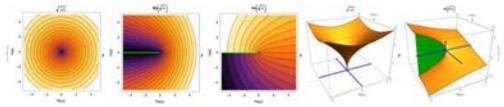
Proceedings "Computer Algebra Systems in Teaching and Research" Vol. V, (CASTR 2017)

Branch Cuts and Branch Points
for a Selection of
Algebraic and Transcendental Functions

Prof. Dr. Robert Kragler
Weingarten University of Applied Sciences
kragler@hs-weingarten.de

Download : http://portal.hs-weingarten.de/web/kragler/mathematica/ ⇒ CASTR2017
Mathematica V.11 Files : CASTR2017_BranchCutsOfComplexFunctions_SlideShow.nb, CASTR2017_BranchCutsOfComplexFunctions.nb, ContourIntegration.m, CASTR2017_BranchCutsOfComplexFunctions.pdf

CASTR2017_BranchCutsOfComplexFunctions.nb

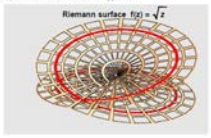


The *branch cut* given as a Boolean function $(x < 0 \&\& y == 0)$ is represented by a *green line* on the negative real axis; the *branch points* are $\{0, \tilde{\infty}\}$. (The symbol $\tilde{\infty}$ denotes ComplexInfinity that is a quantity with infinite magnitude but undetermined complex phase; here the phase is π so that $\tilde{\infty} := -\infty$.)

• **Riemann Surface of $\sqrt{z}$**

An alternative to branch cuts for representing multi-valued functions is the use of *Riemann surfaces* where the multi-valued function has a unique value on a particular sheet. (see e.g. M. Trott [11] and S. Kliveš [12])

Procedures RiemannSheetFcts, RiemannSheets, RiemannClosedPath ⇒ Appendix

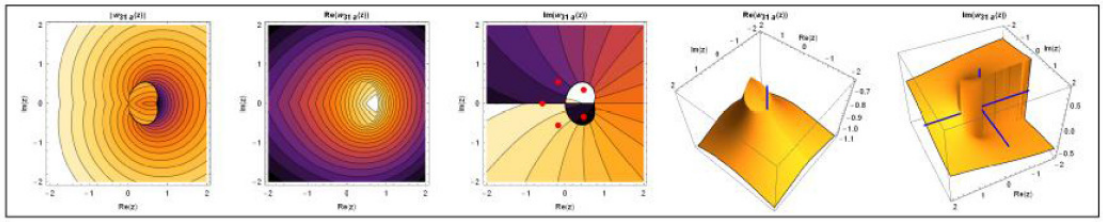


• **General remarks on *Branch Cuts***

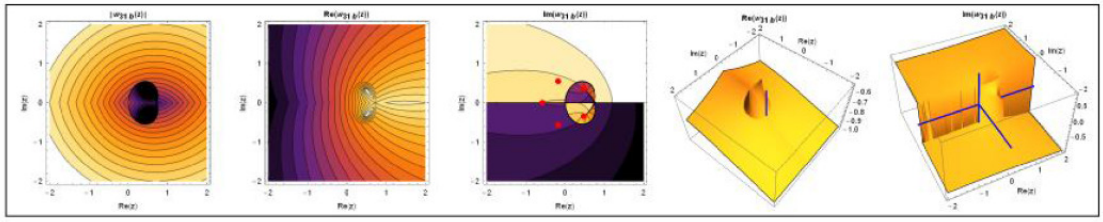
Branch cuts do not occur for single-valued functions $f(z)$ such as trigonometric, hyperbolic, integer power and exponential functions. However, their *multi-valued inverses* $f^{-1}(z)$ such as ArcSin, ArcCos, ArcTan, ArcCot, ArcSec, ArcCsc and ArcSinh, ArcCosh,

CASTR2017_BranchCutsOfComplexFunctions.nb

$w_{31,a}(z) = \text{Root}[\#1^6 - \#1 - z \&, 1]$



$w_{31,b}(z) = \text{Root}[\#1^6 - \#1 - z \&, 2]$



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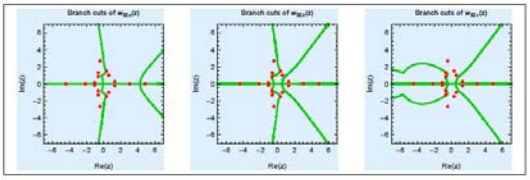
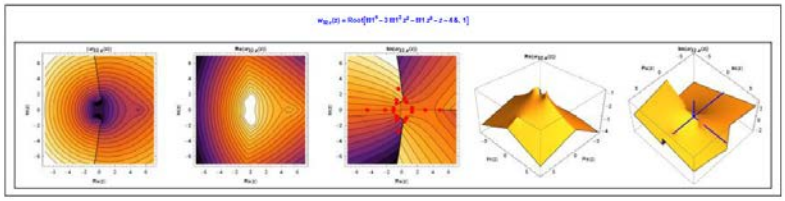


These branch cut plots will be overlayed with the corresponding contour plots of $\mathbf{Im(w(z))}$ below.

For the remaining function branches $w_{32\,d,e,f}(z)$ no branch cuts are found.

Step 3 : Visualization of $w_{32\,a,b,c}(z)$

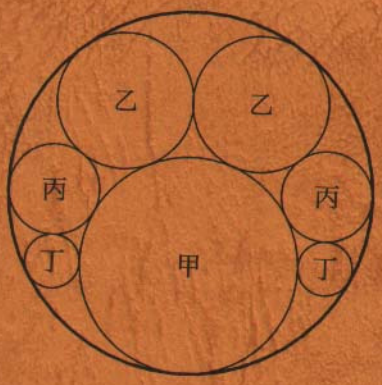
Here, the function branches $w_{32\,a,b,c}(z)$ are displayed only.



"WASAN"

- Basic Problems and Solutions -

Geometric Constructions with Cinderella and KETCindy



by

Hinoto YONEMITSU

Hideyo MAKISHITA

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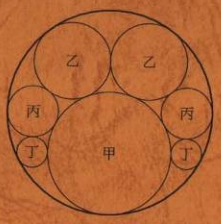
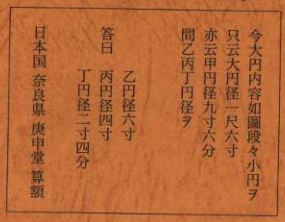


Koushindo's Sangaku, Nara, Japan



The Problem

In the diagram above, the large circle has seven circles inside which one first circle, two second circles, two third circles, two fourth circles are inscribed to the large circle.

When the large circle diameter is 16 and the first circle diameter is 9.6, find the second circle diameter, the third circle diameter, and the fourth circle diameter.

Answer: the second circle diameter is 6, the third circle diameter is 4, and the fourth circle diameter is 2.4.

甲: the first circle, 乙: the second circle,
丙: the third circle, 丁: the fourth circle.

"WASAN"

- Basic Problems and Solutions -

Geometric Constructions with Cinderella and KETCindy

To
Dr. Katica Stevanović Hedrih
カティツァ ステバノビッチ ヘドリッヒ

From Hideyo Makishita
牧下英世

by

Hinoto YONEMITSU
Hideyo MAKISHITA

Introduction

Hinoto YONEMITSU

The author
former Nagasaki Prefectural Senior High School,
mathematics teacher.

Hideyo MAKISHITA

The author and the translator
SHIBAURA Institute of Technology, Associate Professor.
former Junior and Senior High School at Komaba,
University of Tsukuba, mathematics senior teacher.

"WASAN"
- Basic Problems and Solutions -
Geometric Constructions with Cinderella and KETCindy

Published 21st July 2016

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307 Fukasaku, Minuma-ku, Saitama city, Saitama prefecture, JAPAN.
hideyo@shibaura-it.ac.jp

This work was supported by JSPS KAKENHI Grant Number 26350198.

Acknowledgments

The 13th International Congress on Mathematical Education: ICME13 will be held in Germany in July 2016. I will have the opportunity to talk about my research presentation, which will be about how to produce mathematical drawings. At this time, I will publish this book as part of my research for drawing figures related to problems of Wasan by application to mathematics. Wasan mainly addressed problems of figures. This book comprises basic problems, but some difficulties exist with drawing. Then I used mathematical thinking to draw figures using Script with mathematical expressions. Figure drawing using Script is extremely useful for mathematics education from the perspective of the application of mathematics to mathematics. This point will be discussed further hereinafter. When mathematical material is added to geometric construction using rulers and compasses, the use of dynamic geometry: DG software is one option, although KETCindy is used for this study because KETCindy is equipped with DG's Cinderella as a Graphical User Interface and is useful for drawing figures using Script as a Command line User Interface. Therefore, mathematically precise figures can be drawn with ease, producing beautiful results.

Finally, I wish to express my appreciation to KETCindy project members including Prof. Setsuo Takato, who provided great assistance in quadratic curve programming. I am also grateful to Prof. Ulrich Kortenkamp for the helpful discussion of last summer at the University of Potsdam. And Mr. Yasuo Matsuda checked our book detail, and he advised us a lot. Especially, he suggested us for the sorting of the problems by mathematical contents, so this book is easy to read and to understand. We thank to Mr. Yasuo Matsuda.

I hope that great numbers of people who challenge to problems and have some interests in Wasan increase.

Hideyo MAKISHITA
21st July 2016

CASTR' 2017, October 18-22, Siedlce, Poland


SALA WYKŁADOWA


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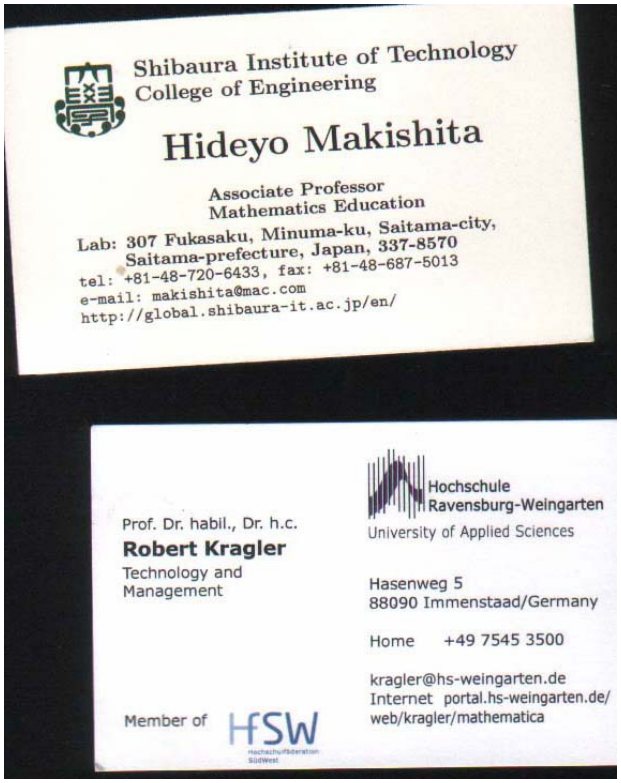
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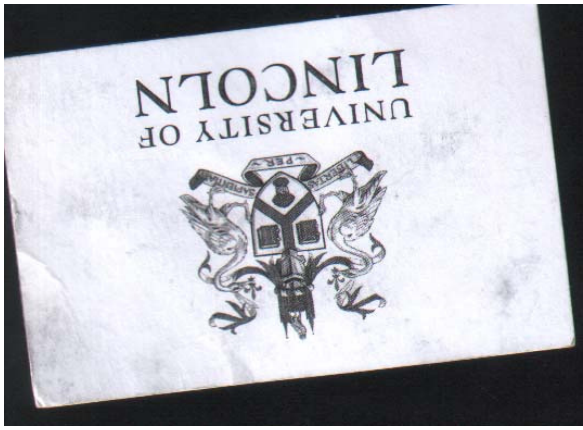
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