MIT 2009
Matematičke i informacione tehnologije

ZBORNIK RADOVA

KONFERENCIJE MIT 2009

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Zbornik radova MIT 2009

ISBN 978-86-7412-052-1 (PMF)
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Radovi su prezentirani na Konferenciji MIT 2009 na Kopaoniku od 28. do 31. avgusta i u Budvi od 31. avgusta do 5. septembra 2009. godine

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Beograd, 2010.

P R E D G O V O R

ZBORNIKU RADOVA KONFERENCIJE MIT 2009

Medjunarodna Konferencija MIT 2009 iz oblasti matematickih, informacionih i telekomunikacionih nauka koja je odrzana na u periodu od 27.08 – 5.09 2009.g. Pokazala je da nauka i prava prijateljstva nemaju granice.

Za kratko vreme Srbi, Rusi i Kazahstanci su organizovali zajedno sa naucnicima iz 12 zemalja sveta uspesnu Konferenciju, koja je i osnov za sve dalje naucne saradnje i ostvarenja, koja imaju za cilj dobrobit covecnstva.

Programski komitet MIT 2009
Organizacioni komitet MIT 2009

Kosovska Mitrovica, decembar 2009. godine

Sadržaj:

Dimitrovski D.[1], Vujaković J.[2], Rajović M.[3]

ON LOCATION OF ZEROS SOLUTION OF SECOND ORDER COMPLEX DIFFERENTIAL EQUATIONS

For second order real differential equation

$$y'' + A(x)y = 0 \qquad (*)$$

in, so-called, period of Sturm, from 1806 to 1826, the first qualitative theorems on numbers of zero solutions $y(x)$ in dependence of $A(x)$ and $[a,b]$ positive interval where $A(x) > 0$, have been established. At that time the concept of iteration were not known enough(it has been strictly introduced in 1860), so at that time the location of zeros could not be precisely determined, according to Sturm. Later, the appearance of theory of group on differential equation enabled an exact approach to location of zero oscillation. However, this has not been the best solution since the oscillations are fundamental natural phenomena related to the Newton's law, while the method based on theory of group was too difficult for such an elementary issue. So, the problem of location of zeros, and of courses the number of zeros, remain unsolved until the time and forthcoming wave of new mathematics did not push this issue at the corner of mathematical science. Recently, we are going back to the problem of zeros of Sturm's equation (*), and naturally we are looking for analogy to Sturm's zeros of real differential equation (*), if we are observing the complex differential equation of oscillation and the Vecua equation. This paper will show various ways of bringing down these equations to the system of second order partial equations, and than to one simple differential equation of the fourth order than further could be brought down to the two simple second order real equation of Sturm, given by (*).

Introduction

The revival of Rolf Nevannlina's idea from 1926, which appeared after the year 2000, brought us to the thought to use simplified Sturm's theorems on real field in giving a unique approach to an oscillating equation $y'' + A(x)y = 0, A(x) > 0$ and to, a so called complex differential equation of oscillation

$$\frac{d^2w}{dz^2} + A(z)w = 0 \qquad (1)$$

where $w(z)$ is function of one complex variable, as well as for the Vecua equation

$$\frac{\partial w}{\partial \bar{z}} = A(z,\bar{z})w + B(z,\bar{z})\bar{w} \qquad (2)$$

where $w = w(z,\bar{z})$ is function of two independent complex variables z and $\bar{z}$ ($z = x + iy$ and $\bar{z} = x - iy$, although they depend on the same x, y , they can be regarded as independent in relation to some specific operators, like $\frac{\partial}{\partial z}, \frac{\partial}{\partial \bar{z}}, \hat{\int} dz,$ and $\hat{\int} d\bar{z}$), by using partial equations, since (1) and (2) can be derived to appropriate systems of partial equations. Zero solutions of the equations (1) and (2)

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