

National Academy of Sciences of Kyrgyz Republic  
Institute of Theoretical and Applied Mathematics

# ABSTRACTS

of the V International Scientific Conference

“Asymptotical, Topological and Computer Methods in Mathematics”  
devoted to the 85 anniversary of Academician M. Imanaliev



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Уч секретарь ОИИП

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Байсүдамов М.Т.

Dear readers and participants of the International Scientific Conference  
“Asymptotical, Topological and Computer Methods in Mathematics”!

It is my great pleasure to introduce you the Collection of Abstracts presented at the Conference, and hope that mathematical ideas and results formulated there will give a new impetus to the emergence of original scientific thoughts, ideas and results.

Plenary reports, presentations and their discussion during sections undoubtedly will bring new valuable achievements to mathematical science.

Let the Conference continue the deal of the V Congress of Mathematicians of the Turkic World and the Issyk-Kul International Mathematical Forum successfully - be a scientific platform for exchange of mathematical ideas, thoughts, finding of new friends, development of scientific cooperation, be a stage to the VI Congress of the Turkic World Mathematicians to be scheduled at Astana, Kazakhstan in 2017.

Sincerely,

Chairs of the International Programming Committee  
of the Conference,  
President of the Turkic World  
Mathematical Society,  
Academician

**A.A.BORUBAEV**

Копия верна  
Гр. секретарь ОИП



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*Вопросы  
к преподавателю*

*М. В. Байрамов*

ABOUT GENERALIZED POINCARÉ ASYMPTOTICAL SOLUTION OF  
THE BOUNDARY VALUE PROBLEM OF THE SINGULARLY PERTURBED  
DIFFERENTIAL EQUATION OF ORDERED TWO WITH WEAKLY  
SINGULAR POINT

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It is considered the bisingularly perturbed boundary value problem of Cole [1]

$$\varepsilon y''(x) + \sqrt{x}y'(x) - y(x) = 0, \quad (1)$$

$$y(0) = a, y(1) = b, \quad (2)$$

here  $\varepsilon$  is a small parameter,  $x \in [0, 1]$ ,  $q(x)$  and  $r(x) \in C^\infty[0, 1]$ ,  $a, b$  are given real numbers,  $y(x)$  is the unknown function.

For the degenerate ( $\varepsilon = 0$ ) equation

$$\sqrt{x}y_0'(x) - y_0(x) = 0$$

the point  $x = 0$  is the weak singular point of this one.

*Theorem.* Let  $a$  and  $b$  be real numbers. Then the solution of the problem (1) will be represented in the form of Poincaré generalized asymptotical expansion


$$y(x)/_{(x=\mu^2 t)} = [U_0(t) + \mu U_1(t, \mu) + \mu^2 U_2(t, \mu) + \dots + \mu^n U_n(t, \mu) + \dots], t = \mu^{-2}$$

here  $\varepsilon = \mu^3$ ,  $U_i(t, \mu) \in C^2[0, \tilde{\mu}]$ ,  $\tilde{\mu} = \mu^{-2}$ .

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