Graphical and analytical study of complex roots of the cubic equation with a parameter

© A.V. Kopaev, S.K. Sobolev

Bauman Moscow State Technical University, Moscow, 105005, Russia

The article deals with real and complex roots of the cubic equation with one parameter. Graphic dependences of these roots on the real parameter, as well as their asymptotic behavior are presented, without using explicit formulas for the roots of cubic equation in which they are expressed via the parameter, but on the contrary, considering the parameter as a function of the roots. The graphic dependence of these roots on the complex parameter is also presented on the complex plane. It constitutes a nomogram for the approximate determination of all three complex roots for any value of the complex parameter. The material can be useful to teachers, and used by them for additional classes with the students.

Keywords: *complex value function, graph, asymptotic form, approximate formula, root.*

Kopaev A.V. (b. 1951), Ph.D., Assoc. Professor of the Higher Mathematics Department of Bauman Moscow State Technical University. Author of more than 20 publications in the field of complex analysis, harmonic functions theory and their applications in porous medium flow theory. e-mail: 5736234@mail.ru

Sobolev S.K. (b. 1951) graduated from the Mechanics and Mathematics Faculty of Lomonosov Moscow State University in 1973 and the postgraduate course in Steklov Mathematical Institute in 1976. Ph.D., Assoc. Professor of the Higher Mathematics Department of Bauman Moscow State Technical University. Author of several articles on mathematical logic, methodology of mathematics teaching and textbooks for students. The Chair of the Methodological Commission of the Higher Mathematics Department. e-mail: sergesobolev@mail.ru