NUMERICAL METHODS APPLICATION AND MATLAB PROGRAMMING FOR SOLVING A TECHNOLOGICAL PROBLEM

MERTICARU Vasile[1], MERTICARU Eugen[1]
[1]Technical University "Gh. Asachi" of Iaşi
vmertica@mail.tuiasi.ro, emertica@mail.tuiasi.ro

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Abstract: The paper presents an application of Newton-Raphson numerical method for solving complex systems of equations that occur in a mathematical model for some parameters that describe the manufacturing accuracy for the technological process of whirling thread-cutting. Within the approach of establishing the mathematical model for exactly describing the theoretical profile on the flank of the external trapezoidal threads generated by whirling, it occurs the necessity to solve some specific mathematical aspects, as following: to determine the angles of contact with the piece for the generating points from the cutting edges of the whirling head’s teeth; to determine the number of the individual helical surfaces that participate at the flank profile’s generation, into an axial plane of study. For solving the complex systems of equations that occur in the mathematical model and particularly in the above presented mathematical aspects, the Newton-Raphson numerical method is proposed. There was conceived the program package EPAX, in MATLAB for WINDOWS, which calculates the values of the theoretical profile errors, in axial section, on the flank of the trapezoidal threads generated by whirling and visualise them on a 2 axis graphic representation, as it is shown in Fig.8, where *Epax* represents the profile error on the flank, in axial section and *ri* represents the radial coordinate on the flank. Using the program EPAX, there can be developed theoretical studies on the influences of the process parameters upon the profile errors. Some results of such a study are presented and discussed in the paper.

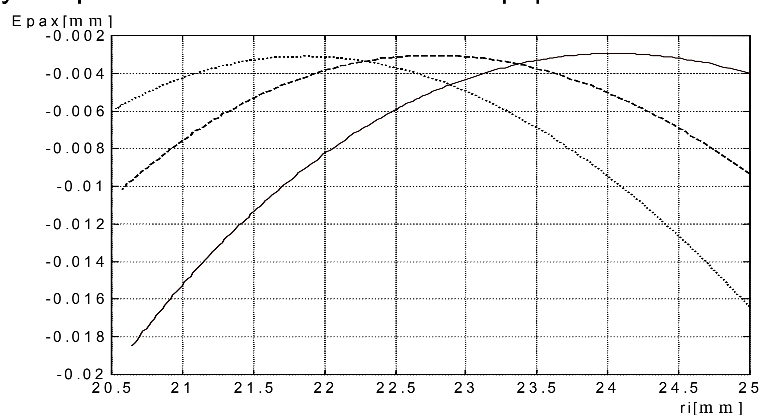

Fig.8. Influence of the setting angle β of the whirling head, upon the theoretic profile of the right flank: d=40mm; p=6mm; n_c=600 rot/min; n_p=6rot/min;
1). _____ $\beta=3°$; 2). - - - - $\beta=3.16°$; 3). .... $\beta=3.3°$;

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