ANNALS OF THE FACULTY OF ENGINEERING HUNEDOARA
2005, Tome III, Fascicole 2

CINEMATIC ANALISYS OF FIRST LINE BRAKING MECHANISM OF COOLING BED AT SMALL PROFILE ROLLING MILLS

[1] ARDELEAN Marius, [2] ZAMFIR Vasile

[1] UNIVERSITY POLITEHNICA TIMISOARA
FACULTATY OF ENGINEERING HUNEDOARA
[2] UNIVERSITY OF PETROSANI
FACULTATY OF ELECTROMECANICHAL EQUIPMENTS

ABSTRACT:
In this paper is presented a study about cinematic analysis of first line braking mechanism, component part of cooling bed at small profile rolling mills.

CUVINTE CHEIE/KEYWORDS:
cinematic analysis, cooling bed, braking mechanism

1. INTRODUCTION

The cooling beds of small profile rolling mills have a very important role in obtaining of a finite product of a high quality. These cooling beds assure a conducted cooling of laminated profiles at the same time wish straightening them during the crossing of the cooling bed fiability, a diminution of exploitation costs.

2. CINEMATIC ANALISYS OF MECHANISM

This mechanism is a plane mechanism, with a single motor element. This is based of four bar mechanism ABCD, four bar mechanism DCEG, four bar mechanism GEFI. Between elements EG- GH and FI-IK is established an 81^o fixed angle. Mechanism is presented in initial position.

Structural decomposition of first line braking mechanism is presented in figure 1, and cinematic scheme is presented in figure 2.

Angle between extreme positions is 47^0, and node path corresponding on complete rotation of motor element is presented in figure 3.

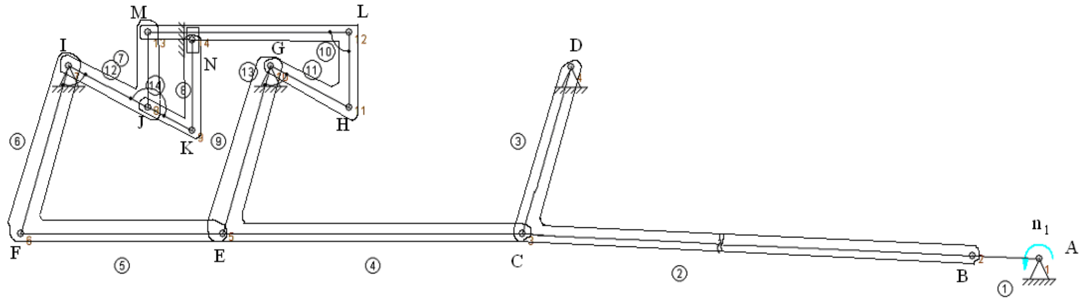

Fig. 1. Structural decomposition of mechanism

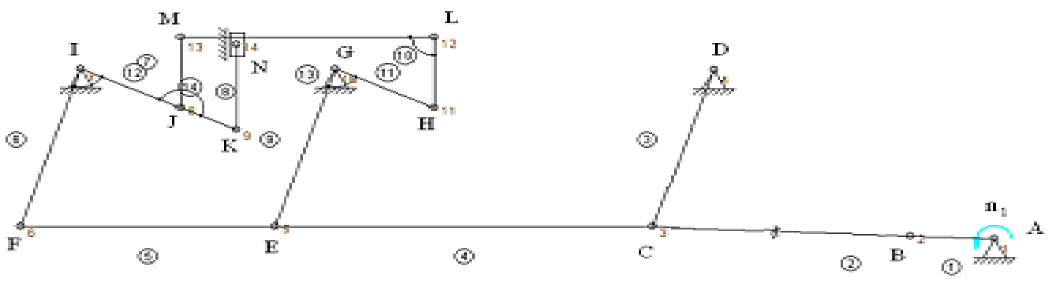

Fig. 2. Cinematic scheme of first braking mechanism

Element length and angular velocity for motor element is:

l_1= 143 mm	l_2= 1800 mm	l_3= 350 mm
l_4= 640 mm	l_5= 430 mm	l_6= 350 mm
l_7= 150 mm	l_8= 105 mm	l_9= 350 mm
l_{10}= 150 mm	l_{11}= 187 mm	l_{12}=187 mm
l_{13}=430 mm	l_{14}= 430 mm	ω_1=2·π rad/s

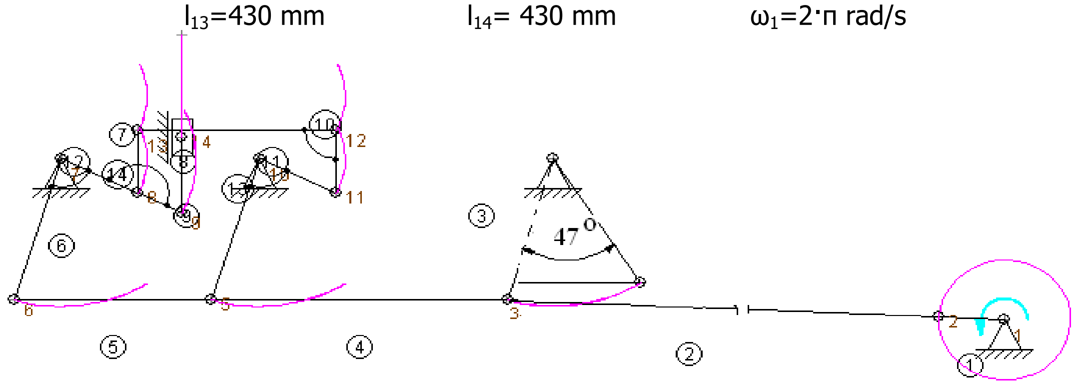

Fig. 3. Node path corresponding on complete rotation of motor element

Over the simulation is presented a few graphical dependences like, variation of relative angle (AR) with time, angular velocity (AV) with time, angular acceleration with time (AA). Angle input motion is considered a linear time dependence. In figure 4, 5, 6 is presented graphical dependences for bar element number 2, 3 and 10.

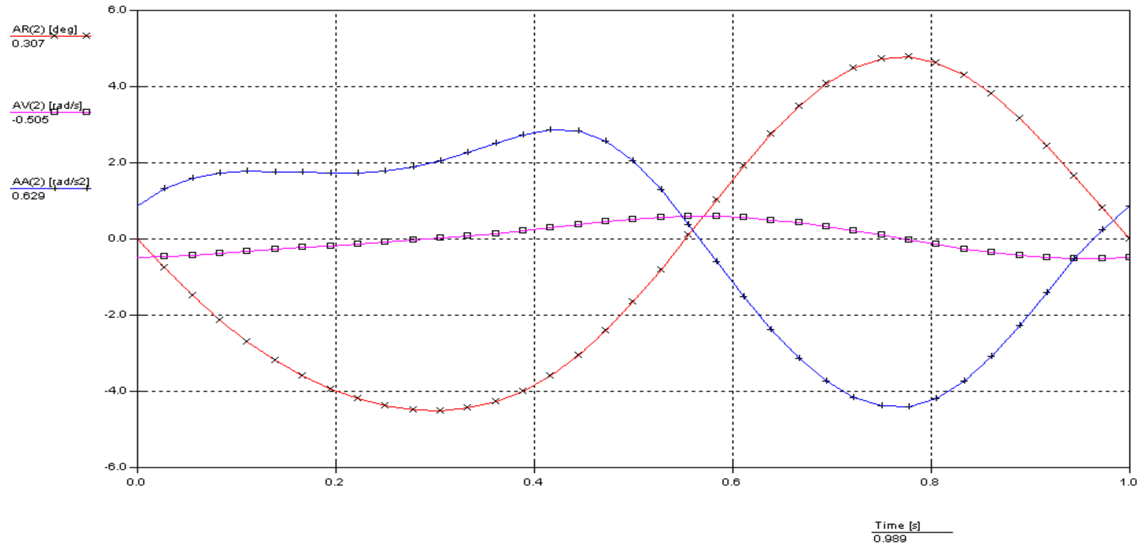

Fig. 4. Variation of relative angle , angular velocity and angular acceleration with time for bar element number 2

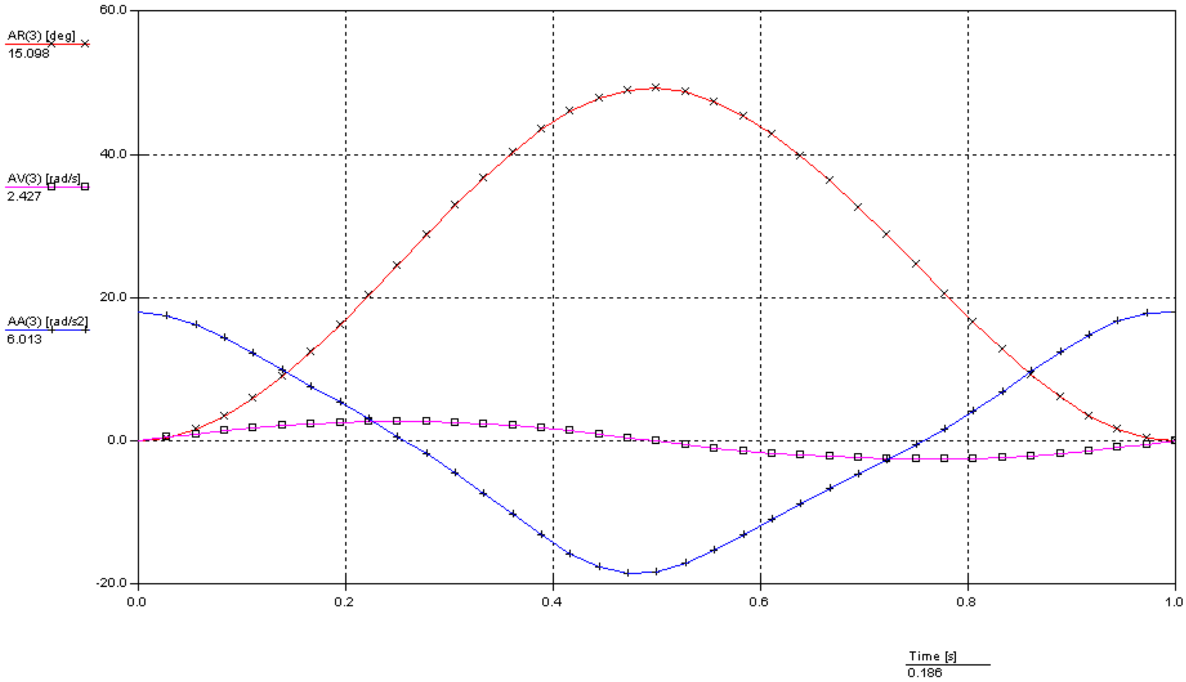

Fig. 5. Variation of relative angle, angular velocity and angular acceleration with time for bar element number 3

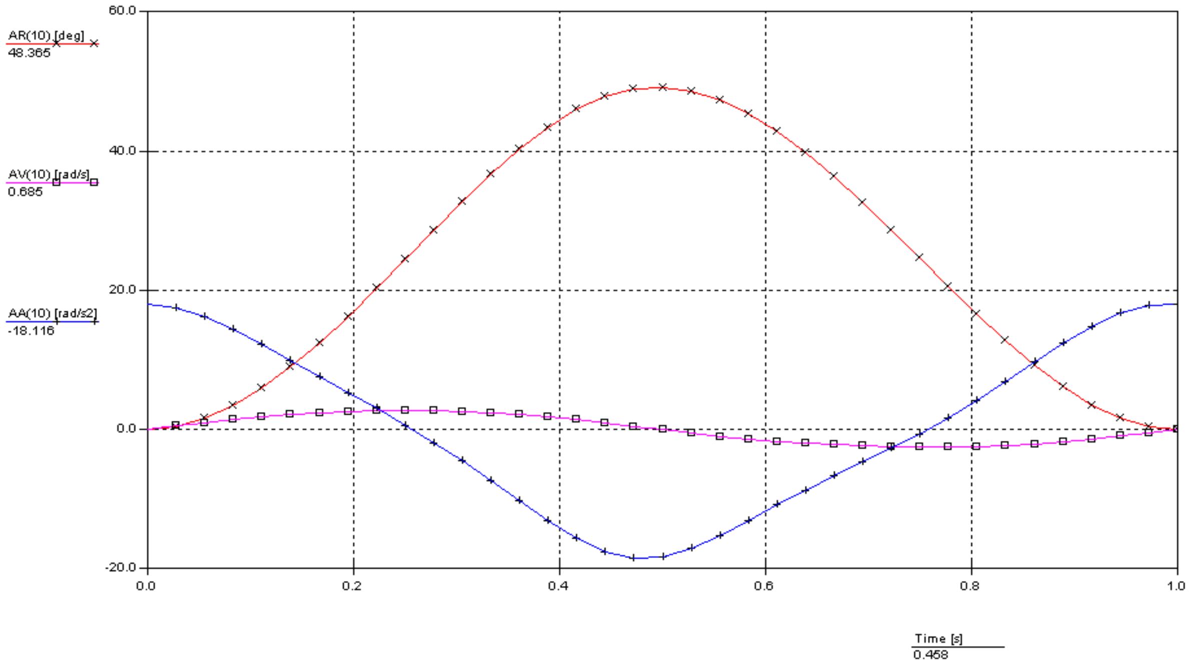

Fig. 6. Variation of relative angle , angular velocity and angular acceleration with time for bar element number 10

Also, is presented a graphical dependence like angle, angular velocity and angular acceleration with time for a few nodes in X-Y projection and absolute value in figure 7,8,9,10,11 and 12.

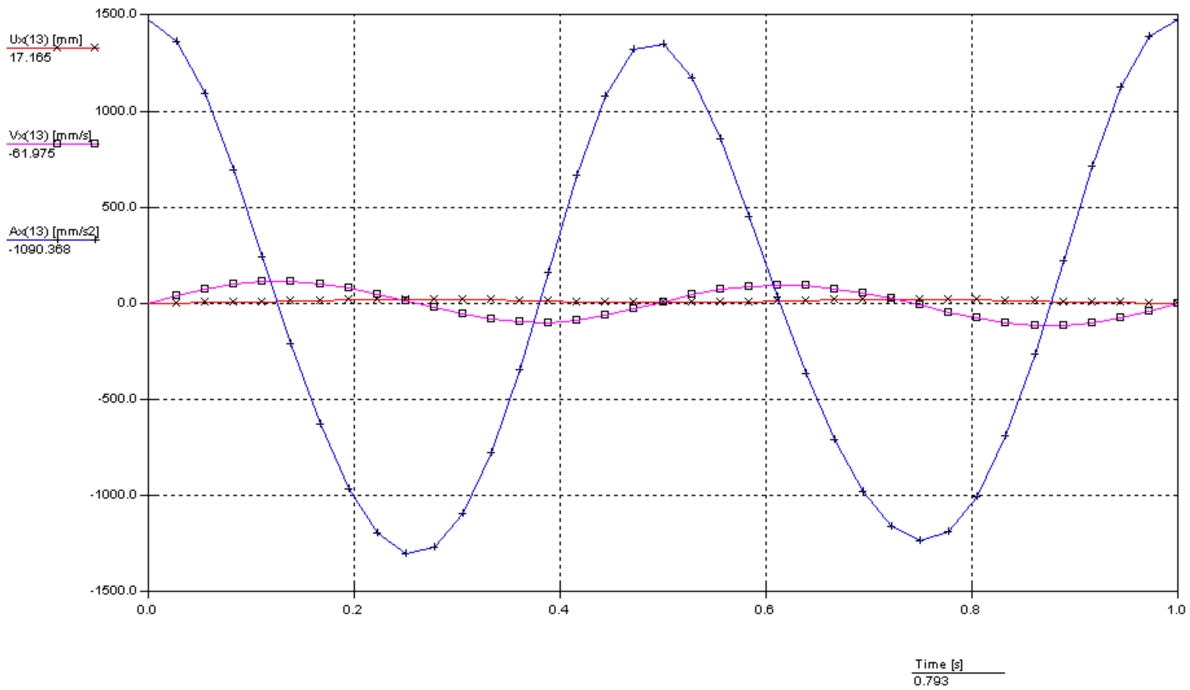

Fig. 7. Graphical dependence - angle, angular velocity and angular acceleration with time for nodes number 13, in OX projection

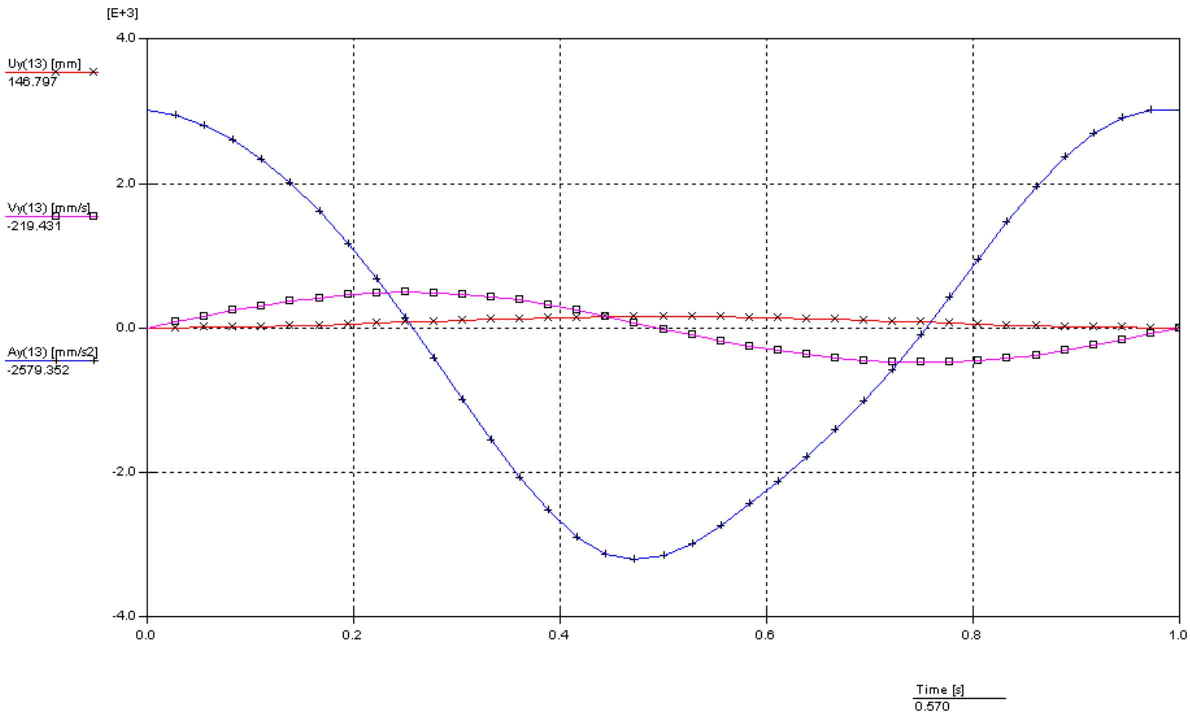

Fig. 8. Graphical dependence - angle, angular velocity and angular acceleration with time for nodes number 13, in OY projection

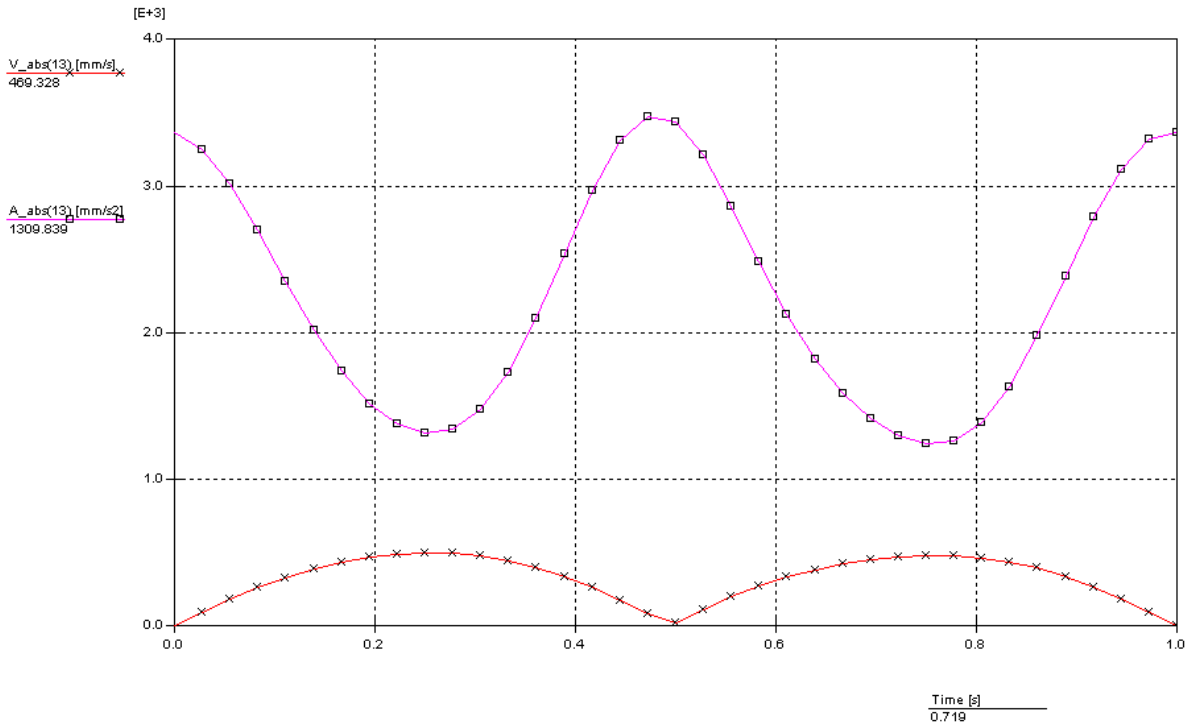

Fig. 8. Graphical dependence - angle, angular velocity and angular acceleration with time for nodes number 13, absolute values

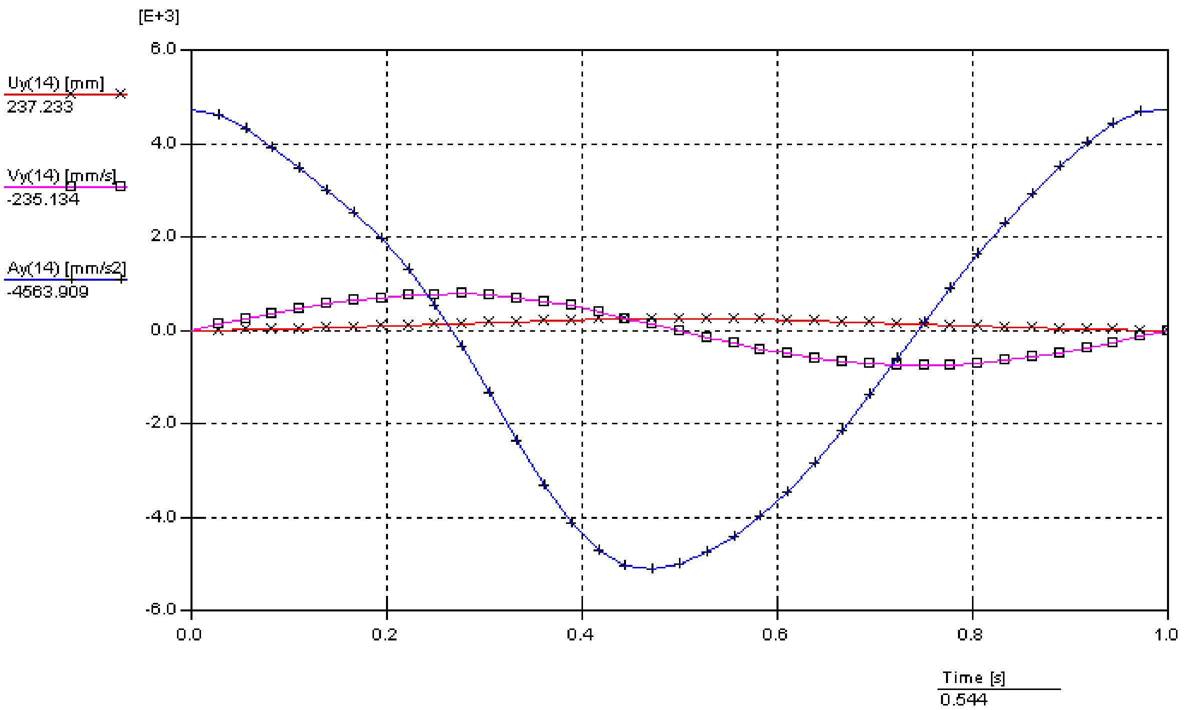

Fig. 9. Graphical dependence - angle, angular velocity and angular acceleration with time for nodes number 14, in OY projection

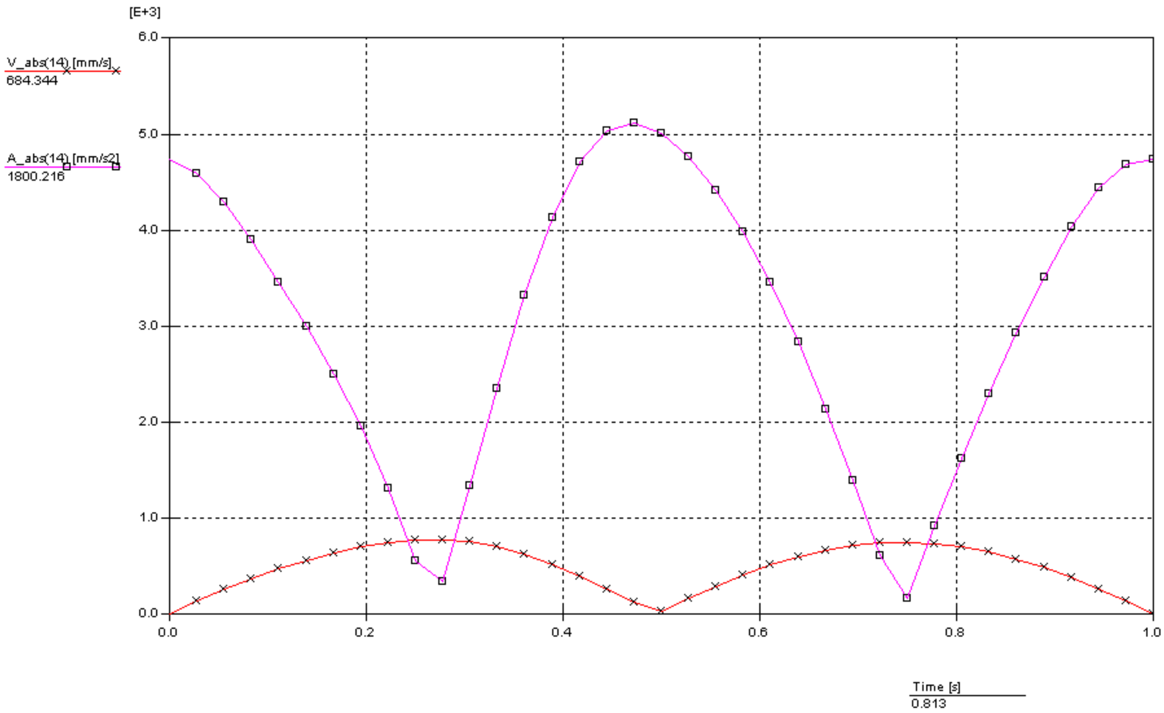

Fig. 8. Graphical dependence - angle, angular velocity and angular acceleration with time for nodes number 14, absolute values

3. CONCLUSIONS

Cinematic analysis is providing a lot of results, which are necessarily in cinetostatic analysis and in study of parts of first line braking mechanism. This analysis program permit a complex analysis of mechanism, and mechanism design is made in cad programs like AutoCAD.

4. REFERENCES/BIBLIOGRAPHY

[1.] Zamfir V., ş.a. – Mecanisme, Litografia IMP, Petroşani 1975.
[2.] Manolescu N., ş.a. – Teoria mecanismelor şi a maşinilor, E.D.P. Bucureşti, 1972.
[3.] Maroş D. – Teoria mecanismelor şi maşinilor, Litografia UPCluj, 1966.
[4.] Handra-Luca V., ş.a. – Introducere în teoria mecanismelor vol. I şi II, Editura Dacia, Cluj-Napoca, 1983