

THE CREATION OF APPLETS BY THE STUDENTS OF MECHANICS IN THE E.T.S.I. MONTES (U.P.M.)

Tear Sanz, G¹; **Grande Ortiz, M.A.1** & **Ayuga Téllez, E.²**

1. Dep. Physic and Mechanics. E.T.S.I. Montes. UPM

2. Dep. Forest Economic and Management. E.T.S.I. Montes. UPM.

During the last courses, the Mechanics students results had worsen significantly. They have important travels to go deeply into the fundamental concepts of the subject. In this situation, we decided to realize a new experience that let them to improve their results.

So, the course 2005-2006 they had the possibility of realize an Applet application with a Java tool. This tool has a simple interface that allows to go deeply into the concepts although the student don't have any knowledge about programming. This experience was a voluntary work for the students.

The result of these works was very satisfactory, as the participant students recognize. In the planning of 2006-2007 academic year we have included a work with the described tool that it will be obligatory to do the partial exams.

Key words: applet application, java, students results

Introduction

The continuous changes in Secondary Education System have important effects on the formation of the University student. In this case, Mechanics, the principal trouble is the slim knowledges in Physic, Geometry and Mathematics. Since 2003-04 course we have detected a important fall in the students califications and what's more a loss of interest in the subject. So we decided to look for a method that let them to overcome the described difficulties.

Material and methods

The objective is to find an educational method that let them to go more deeply in the Mechanics concepts [1-7]. Besides, we think that it is very important that the students are able to create something by themselves. The selected tool to get this objective is "Applet Descartes" (software in Java), an application of the Descartes Program [8]. It is a formed applet, designed to present educational interactions with numbers, functions and graphs. This tool is very useful to understand the relations between the equations, their graphs and the elements that make up them and it does not need programming knowledges.

The work method is the next:

1. The students select a study theme
2. The professor passes the study theme
3. Mathematical analysis of the problem
4. Transcription of the defined equations to the application
5. Verification of the simulation work; 6. Feed back of this process.

All this process is monitored by the professor in tutorial class.

Results and conclusions

The results of this tutorial work in the students are: better understand of the Mechanics concepts; higher interest in the subject; they seemed self-confident; improvement of the professor-student communication. The improvement of the communication has regained professor's faith in the students. So this method could be a good solution to the detected troubles. In the future we try to do a quantitative evaluation of the results. Two examples of the students applets are the figures 1 and 2:

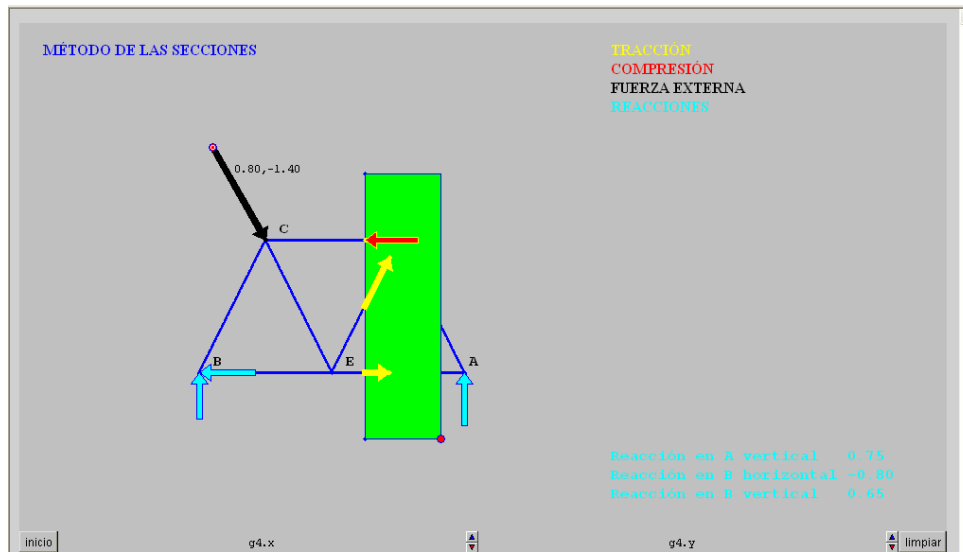


Figure 1. Example 1: Calculation of tension forces in a framework with the sections method

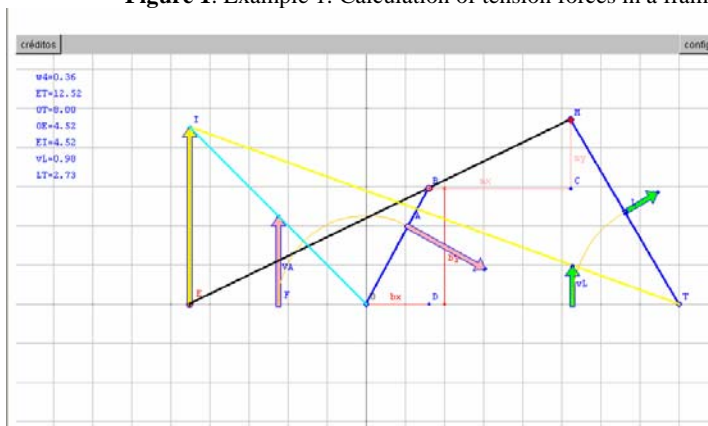


Figure 2. Example 2: Velocity analysis of a four-bar linkage

With the aid of the described method the University student will be able to face up to the problems resolution in general. This is very important in the engineer education. So, this course (2006-07) the tutorial work with applets is a part of the student assessment.

References

- [1] I. Álvarez and B. Kilbourn, *Journal of Digital Contents* **2**, 132 (2004).
- [2] Erika Mechlová, Libor Koníček and Antonín Balnar, *Journal of Digital Contents*, **1**, 19 (2004)
- [3] B. Steren dos Santos, *Proceedings of the 2nd International Conference on Multimedia and Information & Communication Technologies in Education*, Badajoz, Spain, 3-6 December 2003, pp. 66-68.
- [1] Feas Esteban, J. et.al. *Lecciones de Mecánica y Mecanismos. Cinemática del movimiento plano*. E.T.S.I. de Montes. U.P.M.
- [2] Feas Esteban, J. et.al. *Lecciones de Mecánica y Mecanismos. Mecanismos I*. E.T.S.I. de Montes. U.P.M.
- [3] Feas Esteban, J. et.al. *Lecciones de Mecánica y Mecanismos. Mecanismos II*. E.T.S.I. de Montes. U.P.M.
- [4] Feas Esteban, J. et.al. *Lecciones de Mecánica y Mecanismos. Dinámica*. E.T.S.I. de Montes. U.P.M.
- [5] Feas Esteban, J. et.al. *Lecciones de Mecánica y Mecanismos. Estática*. E.T.S.I. de Montes. U.P.M.
- [6] Tevar Sanz, G. & Grande Ortiz, M.A., 2004. *Problemas de cinemática*. Fundación Conde del Valle de Salazar. Madrid.
- [7] Tevar Sanz, G. & Grande Ortiz, M.A., 2005. *Cuestiones de cinemática*. Fundación Conde del Valle de Salazar. Madrid.
- [8] Ministerio de Educación y Deportes. Programa Descartes. <http://descartes.cnice.mecd.es/>