Interactive Multimedia for Engineering Statics

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Abstract

This paper describes the development, implementation, and functionality of an interactive multimedia program designed to assist students in learning basic concepts in engineering statics. The program, currently called Multimedia for Engineering Statics, and covers the same material addressed in a typical, undergraduate Statics book. It is designed to serve as a third source–in addition to lectures and textbooks–from which engineering students can learn about statics.

In today's academic environment, students sometimes learn theory they can't transfer to real situations, or have experiences that they can't explain or generalize. With this program, the focus has been to integrate computer-based simulations with graphics, audio components, animations, videos, and hypertext, into a self-contained program that will assist students taking a first-year undergraduate statics course. The goal: to embody the theoretical and discursive aspects of statics with experiential simulations in the same program. The result for the students will (hopefully) be a more efficient learning process and a deeper understanding of statics.

With many applications in the field of education, multimedia programs are particularly well suited for implementation in engineering education. Many topics in engineering are abstract and difficult to visualize, such as work and energy. Others are difficult to visualize due to the three dimensional nature of statics. Concepts are usually taught by developing abstract mathematical models and fundamental physical principles, and then employing them to solve practical problems. Connecting abstract models with practical situations and presenting time as an independent variable are troublesome facets in the engineering curriculum, especially at the introductory level.

This program, which is example based, is comprised of 35 example problems, each of which illustrates a specific concept in Statics. Each example is presented in four parts: Introduction, Theory, Solution, and Simulation. The first three parts, which incorporate graphics, audio components, animations, videos, and hypertext, introduce a problem to the user, present specific concepts in statics that are required to solve the problem, and apply the concepts to solve the problem (Fig. 1). The fourth part allows the student to experiment with a computer generated simulation of the problem as shown in Fig. 2. Reference material for engineering statics is also accessible via interactive, on-line appendices.

In order to make Multimedia for Engineering Statics accessible to the widest variety of engineering students, Multimedia for Engineering Statics will be distributed on CD-ROM by Addison-Wesley Interactive (AWI). The CD-ROM will be in a form that is compatible with both Windows and Macintosh platforms.

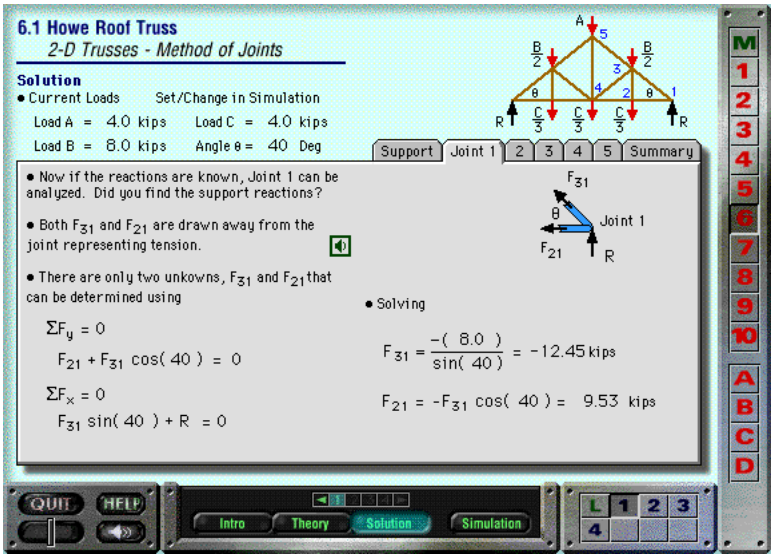

Figure 1. Typical solution screen

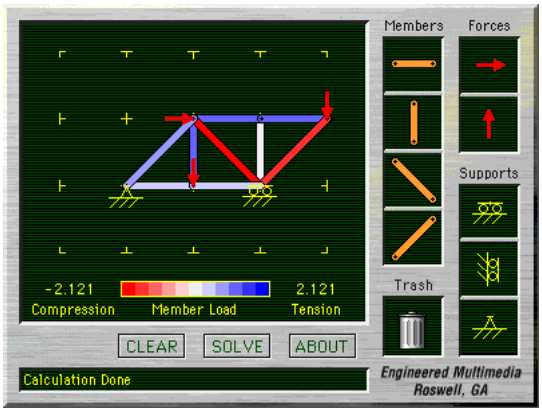

Figure 2. Typical simulation screen for example problems.