

## ABSTRACT

This dissertation developed a resource including an open source computer algebra system (CAS), Maxima-aided applications for electrostatics studies and researches. These applications were presented as web contents which conform to Sharable Content Objects Reference Model (SCORM) standards.

Maxima-aided applications include the methods of the effective uses of Maxima and symbolic computation techniques for electrostatics and vector analysis, which is extensively used in engineering of electromagnetic fields. The performance of Maxima, as a mathematical and instructional tool, was exhibited and enhanced through the work. Programming methods in Maxima's user language were demonstrated.

The applications were improved according to the pedagogical needs, which are declared by instructors and students. The content was designed parallel to the curriculum to encourage; instructors to make use of it in their lectures, as well as students, to use in their self-studies and scientists to employ it in their researches.

Considering the power and the popularity of the web technologies, the work was redesigned as a web content that can be shared through the web and Course Managements Systems (CMS). This idea was executed with another open source XHTML editor; eXe. It can convert any digital content to a web object, conformant to IMS Content Package, SCORM 1.2, or IMS Common Cartridge formats.

Finally, such a rare and detailed sample study will reach through the web and give hints at the use of Maxima to CAS users, Maxima's developers, educational institutions and ministries, especially in developing countries.