A Contribution to Using MATLAB in Teaching Numerical Methods at Technical Universities

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The text makes a contribution to the issue of reasons for and ways of using computers in teaching mathematics. I focus on the subject of using MATLAB in teaching numerical methods. Some typical misconceptions and prejudices in (students') attitude towards algorithm development in practical classes are also mentioned. The article is set in the background of FEEC BUT (compulsory subject *Mathematics 3* taught in the second year of the bachelor student programmes).

Numerical methods in mathematics are an integral part of training prospective engineers. Due to its often lengthy computations students usually label it as uninspiring and mechanical part of mathematics where no creative abilities are needed. They also point out that no true practice can be performed as curricula are tight. Yet this prejudice can be turned into an advantage as the nature of numerical methods makes it ideally suitable for computer-aided teaching.

The format of practical classes discussed in the article follows from the belief that once students themselves design an algorithm regarding a particular numerical method, the efficiency in practising it increases. (This does not mean that the question *Can this particular task be solved by this particular method?* should be ignored or omitted; verifying conditions of use is equally important.) It seems to be a time-saving format as well, as once students are in possession of an algorithm, have access to the computer software, they need only to consider the necessary assumptions and considerations of the particular method and can (to a great extent) make the tasks on their own or compute tasks found elsewhere. Such a script then works as a verification of the often lengthy hand computations, which cannot be performed in class for time reasons.

Two examples of tasks solved by the means of numerical methods are considered in the article: the task of finding a Newton interpolation polynomial and the task of interpolation by natural cubic spline functions.

For both cases, a typical student's encounter with the subject matter is followed and the problems he or she faces are discussed.

Both cases focus on the problem of understanding (for students often misleading) notation of the numerical methods problems. Apart from this the former example shows that algorithm development does not require any special "programming" skills (the issue of what "programming" is is also touched upon in the text). The latter case (interpolation by cubic spline functions) is an outstanding example of lengthy computations and low efficiency of solving numerical methods problems in practical classes with tight curricula.

For both examples MATLAB scripts are included and the necessary skills for designing them are mentioned.

The contribution is linked to an article discussing results of a questionnaire survey among

a respresentative sample of FEEC BUT students on their preferences of the nature of practical computer classes as well as to other articles discussing problems of teaching mathematics at FEEC BUT.

References

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