"Maple and Mathematica - A Problem Solving Approach for Mathematics"
By Inna Shingareva and Carlos Lizárraga-Celaya,
second edition, Springer Wien, 2009, softcover, xviii+483pp., $69.95,
ISBN3 978-3-211-99431-3.

Review by
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I believe that the material in this book belongs in electronic form only: I doubt if anyone would actually want to read the print version. Having said that, the content on the CD may be useful to a few people, and CD or Web publication of the material - without the book - may be appropriate.

John D. Carter in a review dated March 2008 of the first edition
`fac-staff.seattleu.edu/carterj1/web/Shingareva.pdf`
began as follows.

"The book under review treats the two computer algebra systems (CAS) Maple and Mathematica. The purpose of the book is not to establish that either Maple or Mathematica is 'better' than the other, but is to simply present and describe a wide variety of sample Maple and Mathematica codes side-by-side."

Carter states, and I agree, that "The book does not provide a good introduction to either Maple or Mathematica for first-time CAS users." Carter continues that there may be some who will find it a useful "introduction to Maple for Mathematica users and vice-versa", and with the 2nd edition providing a CD with the codes, this is truer of the 2nd edition than of the first. However, I'm less sure of the value of the material even for this. Such people would find equally useful many of the numerous other books, including references [1] and [27] of the 2nd edition, which provide parallel accounts in each of Maple and of Mathematica.

Perhaps it is worth considering the range of situations where both CAS might be of interest together.

- There are interests in *comparing* the mathematical capabilities of the CAS. Wester's book, reference [52], cited as [We] below, provided test suites in several CAS. The value of the test suites diminishes rapidly with time as the different versions of the software address issues shown up by the tests.
  There are books which discuss algorithms used to provide the algebra capabilities of both CAS, e.g. [GKW].

- There are many applied mathematicians who make *straightforward use of both* Mathematica and Maple. Sometimes this is done to check the result of one against the other. Sometimes one starts with one CAS and at the very last step, even though one's intuition says the step might be do-able, the CAS doesn't do it, but the other one does. In practice, the on-line helps in the CAS combined, if one wishes, with

one of the many good books on programming in the CAS, is enough. And, of course, there are many places where 'one-liner' translations are treated, e.g. `http://amath.colorado.edu/computing/mmm/`

- There are mathematical programmers who *code with some sophistication specialised packages* and provide these in both CAS.
- There are people, providing tools for *translation* between subsets of the CAS, especially concentrating on the mathematical functions. The likely users of such tools include the mathematical programmers mentioned in the preceding item.

While I consider the material in the book inappropriate for the first three groups above, it is just possible that the material on the CD could be developed to a form which might be of use for the last group. More detail on this is given later in this review.

When switching between the two CAS, there are many details to consider. To name but one, one which is easy to describe, it happens that `EllipticK(x)` in Maple (at least in 9.5) is almost equivalent to `EllipticK[x^2]` in Mathematica (at least in versions up to 7); one may expect to get the same result in both systems, at least while $0 < x < 1$. Collecting items of this kind, and other items where the translation is simpler, as done by the authors is a worthwhile endeavour.

There are continuing efforts at tools to help in the translation of code from each of the CAS into the other. Personally, I think the efforts that are most likely to be successful – and useful – are those for Maple to Mathematica translation, particularly concentrating on mathematical applications. Mathematica as a language lends itself to other uses, e.g. CellularAutomata, and some of the programming constructs are not natural to Maple. Some of the translation tools are written in perl or similar. The others I mention here are written in the CAS's language. Those written in Mathematica include

- for the conversion of Mathematica into Maple syntax: MapleForm by Juergen.Schmidt, 1996; Format.m by Mark Sofroniou, also from the mid 90s and still available from the library.wolfram web site;
- for the conversion of Maple 9 Worksheets to Mathematica Notebooks code by Yves Papegay, 2004. The work on this seems to have been discontinued, and I think it may be too much to expect that anything other than translation of subsets of the languages might be achievable.

Maplesoft have provided with recent maples (from maple 11) their MmaTranslator, with its usage

```
with(MmaTranslator);
lprint(FromMma(‘some Mma commands‘));
```

Again this is, as its on-line help explains, really a very incomplete translator.

It may well be that the authors of such software might find real value in a good large collection of codes with a mathematical coverage similar to that on the CD of the 2nd edition. It may be that a small subset of the CD up on the web, in some sort of wiki allowing different styles, would be worthwhile. The authors could then, when appropriate, adapt their style in later revisions of the CD to good ideas submitted through the wiki. It is very easy to find fault with the style of the programming in the present CD.

There are many typos in the text, but not, I think in the code.

I have assessed the CD using Mac OSX. I followed the instructions on the CD: install Acrobat Reader (as it has a pdf to text translator), then load start.pdf. (I looked around on the CD for .txt files with the code, but failed to find any.) One then has to edit the code into separate files - a file for each problem in each CAS - to be able to run it. Better organization of the code on the CD is possible.

I find it disconcerting that the code on the CD isn't always identical to that in the book, e.g. the Mathematica of Problem 4.29 where the `mult` function is earlier in the print version. I assume that there has been some editing to save paper. The code on the CD should have been pretty-printed, put through some sort of code formatter, so that it is more humanly readable. After converting the pdfs to text and editing so that the different languages were in different files, I have used vim to highlight, in colour, the reserved words in the files. As vim knows about both Maple and Mathematica having the code for the same problem in the different languages in different, simultaneously visible, terminal windows enables a more informative display than just the pdf that is on the CD. The code - along with textual explanation - should also be provided in Mathematica notebook and Maple document/worksheet formats, both of which automatically 'prettyprint', and colour reserved words and so on.

Finally, I'm not happy about a marketing issue. Both the preface to the book, and the publisher's pages on it
http://www.springer.com/springerwiennewyork/mathematics/book/978-3-211-99431-3
end with the statement
"Finally, this book is ideal for scientists who want to corroborate their Maple and Mathematica work with independent verification provided by another CAS." They attribute this to J. Carter, SIAM Review 50: 149-152 (2008). However this article by Carter has a review of Mathematica6, with no mention of the book. Carter's review of the 1st edition book is elsewhere.

References

[We] M.J. Wester, *Computer algebra systems: a practical guide*. Springer: 1999.

[GKW] J. Grabmeier, E. Kaltofen and V. Weispfenning, *Computer algebra handbook: foundations, applications, systems*. Springer-Verlag: 2003.