Curriculum Vitae of Josef Schicho

Education and Positions

Born 1964, PhD in Mathematics at JKU Linz in 1995 (supervisor Joachim Pfalzgraf), Habilitation for Mathematics at JKU Linz in 2001.
1997–2003: assistent professor at JKU Linz.
2003–2013: group leader at RICAM (Austrian Academy of Sciences)
since 2013: assistent professor at JKU Linz, group leader at RICAM.

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Scientific Interests

Computational algebraic geometry, polynomial equations

10 most important publications [1, 2, 3, 4, 5]

Scientific Activities (Summary)

- 105 publications in refereed journals
- editor of 4 special issues in refereed journals [6, 7, 8, 9] and two refereed proceedings [10, 11]
- approximately 40 invited talks at international conferences
- leader of 4 FWF projects (1 ongoing) and co-leader of 4 FWF projects (1 ongoing)
- partner in a funded national research areas (SFB) and in 2 Marie-Curie-Sklodowska networks (1 ongoing)
- reporter of the Austrian science fund (FWF), since 2011
- member of the editorial board of the Journal of Symbolic Computation, since 2003, and of the editorial board of SIAM Applied Geometry and Applications, since 2017
- organizer of ISSAC 2004, MEGA 2007, coorganizer of the Radon Special Semester 2013
- programm committee member at various conferences on symbolic computation
- PhD advisor of 15 PhD students (3 ongoing)

References

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[11] J. Gutierrez, J. Schicho, and M. Weimann, editors. *Computer algebra and polynomials*, volume 8942 of *LNCS*. Springer, 2015. Selected papers from the RICAM special semester Applications of algebra and number theory, 2013.

Vision Statement

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1 What is Symbolic Computation?

"Computation" means the mathematical (systematic, algorithmic) manipulation of objects or data. An object or datum is called "symbol" if it has the role of a placeholder, i.e., it could be substituted by something different. A symbolic object is one that contains symbols. Symbolic computation deals with the manipulation of symbolic objects. In this sense, it is possible to consider virtually all mathematical objects as symbolic: as soon as a notion comes to rise by any process of abstraction, it has the potential to become concrete again. Even a number can be considered as symbolic in this broad sense. The journal description `https://www.journals.elsevier.com/journal-of-symbolic-computation/` explicitly mentions three types of symbolic objects: "objects in formal languages (terms, formulas, programs); algebraic objects (elements in basic number domains, polynomials, residue classes etc.); and geometrical objects" (see also [Buchberger (1985)]). The definition is clear and compact, and it is always my first reply when asked for a definition of the field of symbolic computation, which still happens quite frequently.

This definition should be complemented by the tradition and the self-understanding of researchers working in this field: symbolic computation is what researchers in symbolic computation do. By this tradition, the following topics are subfields of symbolic computation or are fields that have a large intersection with symbolic computation:
Differential algebra and related topics such as symbolic summation, holonomic functions, D-finite series, generating functions, algebraic methods in

dynamical systems.
Polynomial system solving, elimination theory, homotopy continuation.
Real algebraic geometry, cell decompositions, real root counting.
Effective algebraic geometry and its quantitive theory, syzygies, toric geometry.
Multilinear algebra, Lie algebra and computational matrix theory.
Sparse polynomials (solving and interpolation).
Computational group theory.
Invariant theory.
Computer algebra systems], their design and implementation.
Automated theorem proving.
Computational geometry, e.g. Voronoi diagrams.

2 Scope of the Journal

The JSC is the main forum for original research in symbolic computation. Its scope is all of symbolic computation as defined above, including the topics mentioned above. An original research contribution is related to a *problem* and to a *method*. The topics mentioned above are defined either by their problems or by their methods or by a mixture of both. Sometimes, original contributions do not stick to a clear categorization; in such a case, the original contribution is in the scope if either the problem or the method (or both) is symbolic.

The definition above makes the field open to extensions to fields which are not yet commonly considered as symbolic computation. I consider this as an advantage. For instance, there are methods in multiview geometry/photogrammetry that belong to effective algebraic geometry and to invariant theory. Researchers in multiview geometry should know/learn about such an intrinsic connection, include the JSC in a literature scan for relevant results, and could consider the JSC as a journal to publish their own results. Other examples are interdisciplinary areas such as mathematical biology or robotics: also in these disciplines, a lot of symbolic computation is happening anonymously, without the researcher being aware that what they are doing is actually symbolic computation. A good instrument to increase such an awareness would be special issues.

On the other hand, extensions of the scope have to be done carefully and moderately. The JSC is specialized, so readers have an expectation which

we should fulfill.

3 Organization of the Journal

First, I would like to point out that in my opinion, the organization that has been established and carried out by Hoon Hong works excellently. The process is clear and transparent and at the same time efficient. The current refereeing procedure, which I would not like to change if I become the editor, is the following: suppose there is an incoming submission. The editor either rejects it outright or asks a member of the editorial board to be the responsible editor. The responsible editor either rejects outright or sends to paper to reviewers. The decision to either accept or reject or ask for a revision is then made by the responsible editor on the basis of at least two independent referee reports. A necessary condition for acceptance is the existence of at least one reviewer who is convinced that the main result is correct.

There is one minor detail which has worked in the past but I still would adapt it because the circumstances also changed over the years. Currently the only reason for outright rejection (either by the editor or by the responsible editor) is "out of scope". In my opinion, there can be other reasons for outright rejection, namely "obvious lack of originality" and "triviality of the result". The time of a reviewer is a valuable resource that should not be wasted if there is already an obvious answer (and since the number of papers and journal is constantly growing, the number of potential reviewers who decline is also growing).

The current publisher Elsevier has been critized for charging large subscription fees and for bundling journal subscription, and many colleagues supported and still support a boycott of Elsevier that was initiated in 2012 (see `http://thecostofknowledge.com/`). Because there are other publishers that would provide the necessary service (distribution of the journal) for JSC at lower costs for the institutions, this would be a reason to change the publisher. Such a change, however, can only take place if the JSC keeps its identity: its name and its entries in scientific databases. After having spoken about this option with the editor Hoon Hong, I am not very optimistic that this is possble.

Another minor change I am in favor of is to use an electronic submission system. The publisher offers the Electronic Manager (EM), the Elsevier Editorial System (EES) or EVISE; a widely used free system is the conference

management system EasyChair. Currently, we do not use such a system because of privacy reasons. But such a submission system can help to organize submissions and to keep better track of routine tasks such as reminding late reviewers. Especially the last point – reminding late reviewers – is important because a hanging submission could potentially be a desaster for a young researcher who depends on a fast processing of his/her contributions. So, I believe that the advantages outweigh the risks/disadvantages.

4 Promotion

Special issues are not only a good instrument to try to convince colleagues that what they are doing can be called "symbolic computation" (as mentioned above), but also to convince them to read the JSC and to submit their results to the JSC. An important type of special issues are special issues related to a conference. The JSC regularily has special issued related to ISSAC and to MEGA; I hope that this cooperation will continue also in the future. For this purpose, I would (if I become editor) stay in contact with members of the ISSAC Steering Committee and of the MEGA Advisory Board; in both cases, the intersection with the editorial board of the JSC is non-empty.

There are many more conferences (regular series or single events) in symbolic computation, and it is clearly the task of the editor to speak to the organizers and show that the JSC, as part of the community and as its main forum for pulishing original research, is interested in the results related to these conferences.

Another instrument are invited tutorial papers (in regular issues; special issue may or may not have tutorial papers, depending on the decision of the guest editor(s)). A leading expert can be invited to write an invitation to some "hot topic", or an explanation of an exciting interaction between existing fields. Or a developer of a useful software package for symbolic computation can be invited to write a primer.

References

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Journal of Symbolic Computation
Editorial Board

Motivation Letter

During my PhD studies, and also as a young postdoc, I was not sure if I were to become a professional mathematician. I always liked mathematics, but there were many doubts: would I be strong enough to compete on the job market? Would my contributions be important enough to be remembered (at least by somebody)? In these times of insecureness, I remember the Journal of Symbolic Computation as a symbol of stability. Here, I could trust that my submissions receive a fair treatment and a thorough inspection, despite the fact that I would not hear a feedback for a few months. My very first paper appeared in JSC, and five years after my PhD thesis this journal was still dominating in my publication list.

My motivation to apply goes back to this valuable experiences: since I have received, in a time where it was crucial for me, something valuable by this journal, I would like to help sustaining this value for young colleagues who could now be in a similar situation.

If I become the editor, my first and strongest efforts would be to keep and expand this most valuable resource of a journal such as JSC: the trust of the mathematical community. The readers trust that the papers in the journal will be interesting and the proofs are correct. The authors trust their submissions are reviewed by competent reviewers, in a fair and transparent process (keeping the anonymity of the reviewers, of course). And the reviewers trust that the time and efforts to review helps to improve a paper and to maintain a high standard of quality.

With best regards,

Josef Schicho