

Establishing a Web Based Archive of Papers in Computational Electromagnetics

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Abstract — This paper extends the proposals and ideas put forward at the Compumag conference in Aachen (2007) and CEM conference in Brighton (2008). It is suggested that a Web based system could and should be developed to create a definite archive of publications in the area of Computational Electromagnetics. The need for such an archive has arisen as a result of a tendency of duplication in published work and to assist in the refereeing process.

I. INTRODUCTION

We wish to build on the ideas first discussed at Compumag Shenyang [1], further developed and reported at Compumag Aachen [2] and CEM Brighton [3]. We outlined several areas of concern at that time:

- The record of early work is in danger of being lost, e.g. the Compumag Oxford (1976) [4] and Grenoble (1979) [5] which were published by the organising bodies with limited number of copies. The same also applies to CEFC which grew out of a series of user meetings held in the USA [6]. There were many papers of importance that should be made available to the modern community.
- The community has voiced the need to undertake the mapping of innovative work onto the main areas of scientific development so that a better understanding of attribution and citation could be made. A compelling reason to do this is to limit the amount of duplication that is appearing in the literature and to assist the refereeing processes for both academic journals and conferences.
- In addition to the published papers a definitive bibliography of published books that remain in print, or are available on the web, or are to be found in most scientific libraries, should be established.
- The body of knowledge that is catalogued is in itself of historical significance but perhaps of greater importance is the identification of problem areas for the future.

II. A WEB BASED SYSTEM

It is suggested that the existing Web based archival system be greatly extended and enhanced. Recently a facsimile copy of the first two Compumag conferences (Oxford 1976 and Grenoble 1979) has been made of all the papers and a PDF file of the entire proceedings produced which has been posted on the Compumag Society Web site [7].

Also now available on the Web site are facsimiles of the technical articles published in the ICS Newsletter [8]. Initially these articles were shorter and reported on recent advances in a particular area – they were in fact more like learned society journal papers, although invited rather than

submitted – but gradually they evolved into more substantial reviews, often of ten pages or more.

A. The framework of the proposed archive

A central component of the archive should be a list of important papers that have shaped the modern developments of computational electromagnetics. It is essential that the members of this list are accepted by the community and monitored by a small working party. The Chair of this working party should be appointed by the ISC board.

B. Initial selection of papers for archiving

In order to establish a coherent mapping we need to define a criterion for inclusion. No single paper, of course, is completely new but it must not merely duplicate earlier work and must contain at least one innovative step. A significant step forward is valid, however, if it improves the efficiency and applicability of an existing method or indeed adapts a technique previously applied to a different discipline, say from a branch of mathematics. The example given in [3] is worth repeating here, that of Richardson (1910) [9], who rigorously established the five point finite difference formula and applied it to real engineering problems. Whilst Richardson was drawing partially on the work of Runge (1908) and Boltzmann (1892) he qualifies as a significant innovator as he established the rules of the method and perhaps ushered in the modern age of Numerical Methods. On the other hand, if a researcher publishes a paper which uses a method that he, or someone else for that matter, had previously innovated and then merely applies it to another problem without any aspects of novelty, interesting as this may be in itself (or from application point of view) and thus worthy of publication, it should not qualify as innovative in the context of Computational Electromagnetics (CEM).

The scenario put forward in reference [3] is one way forward:

- Define subject areas, e.g. Fundamentals and Theory, Differential Methods, Integral Methods, Hybrid and Semi-analytical, Numerical Techniques, Software Methodology, Material Modelling, Mesh Generation and Adaption, Post-Processing, Coupled Problems, Optimization and CAD.
- Compile a list of candidate papers utilizing input from the community. A short summary of each selected paper should be included as well as a critical justification of its importance.

- The archive working party to make the selection; this already has started within the remit of the International Compumag Society but we suggest representatives from other organizations should also be involved.
- Establish a file of review papers perhaps drawing on the existing review articles that have been published in the ICS Newsletter [8] and commissioning new ones to cover gaps.
- The community, in its widest sense, should be invited to criticize the selection, suggest modifications and ideas for extending its relevance and value. We also recommend that time should be made available to the working party at each Compumag conference for discussion with the community.

C. Book bibliography

A list of published books and monographs with reviews attached should also be added to the archive and include not only those that are regularly cited by researchers but also those which relate CEM to broader areas. As argued before [1], CEM is both a special case and part of the wider subject of computational mechanics, with its own very rich literature and significant achievements. Similarly, field simulation aided design draws on advances in general optimization techniques, coupled formulations, developments in other branches of physics, and so on – care must be taken when establishing a list of relevant books but the potential value of such a catalogue should not be underestimated.

D. ICS Newsletter

A common feature of the most recent publications in the Newsletter is that they describe the state of the art, emphasise the important milestones, describe the most recent advances and provide a rich list of references; it could therefore be argued that they are indeed true reviews. Therefore the archive will benefit not only from the list of historic papers which will aim to correctly attribute the classic contributions to our subject but read in combination with the Newsletter Reviews give a deeper understanding of our subject. It is important therefore that gaps in our coverage should be identified and new reviews commissioned.

E. Feedback from the community and further additions

Before completing the first edition of the archive a mechanism must be created for the community to contribute to the process and provide constructive criticism. This may result in some items removed and others to be added as it is important that some consensus is reached at this stage. It would probably be unrealistic to hope for complete agreement, but general support should be possible.

F. System maintenance and updates

Once the initial set of papers and books has been established, the archive must be maintained but also allowed to grow to reflect progress and new achievements.

G. The role of the International Compumag Society

It seems natural and almost obvious that the Society should take a leading role in this venture. If successful, this will offer an important service to the community.

III. CONSIDERATIONS FOR FUTURE

At the Brighton conference [3] the authors said that, ‘over the next few months the authors together with the proposed ICS working party will develop a case study to demonstrate how the creation of the archive could be achieved following a preferred scenario – this should not be viewed as a definite proposal but more as an example using a selected narrow research topic’. Although the working party has not been constituted yet, the authors hope to achieve this and report at the conference in Sydney. Also at that time it is hoped that a working party will be established.

To conclude and re-emphasize the points made earlier, feedback from researchers will be an essential factor in establishing an archive system to which the community would subscribe. The CEM Community should accept this as a challenge to create appropriate mechanisms, establish a process and provide reliable feedback mechanism.

IV. REFERENCES

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