Guest editorial

CFD in Indoor Air

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As a leading journal for members of the indoor environment community, *Indoor Air* strives for excellence in all published papers. For experimental findings or investigations with human subjects, measurement uncertainties and statistical significance of results are routinely reported. The editors of *Indoor Air* also wish to promote papers using Computational Fluid Dynamics (CFD) as a research tool. For such investigations, there are a number of corresponding measures that qualify the results and ensure quality. For that reason, we have been asked to suggest the minimum amount of information that should be included in CFD related papers submitted to the journal. Naturally, such suggestions will be biased by our personal experience, but we believe that we have covered the major topics of concern.

Full assessment of the quality of a given CFD article requires 1) Adequate information pertinent to the governing equations and numerical methods, 2) justified estimates of the expected accuracy of the numerical results. If either of these is omitted, excellent studies may be considered poor and vice versa. Specifically, to ensure that all papers in *Indoor Air* are of high quality, our suggestion to the editors (and reviewers) is that CFD related articles contain the following information:

- The description of the CFD code, boundary/initial conditions, and turbulence model should be detailed enough so that the calculations can be reproduced by another investigator. Existing CFD codes should be fully cited.
- Topology and size of the computational grid should be described.
- The choice of differencing scheme should be described. Use of differencing schemes that are first order accurate (in space or time) is discouraged and solid justification should be provided if a first order scheme is used.
- Influence from grid-dependency should be addressed and, at a minimum, a qualitative estimate of the expected deviations from the exact solution to the governing equations must be given.
- The range of y^+ should be stated and justified in accordance with the employed turbulence model.
- If possible, calculations should be validated against measurement or standard test cases of a similar problem.

For researches, who routinely impose quality control in their work, it will be straightforward to comply with the above points. We do realize that, for the majority of CFD studies, significant human and computational efforts are necessary to meet the requirements. Nevertheless, we believe that the additional effort is more than compensated by the fact that the article (if accepted) is published in an archival journal that sets standards for CFD studies, therefore increasing the importance of the article.

For more details on quality control for CFD calculations, see the paper by Sørensen and Nielsen (2003) in this issue of *Indoor Air*, as well as references herein. We strongly recommend the cited publication by the European Research Community on Flow, Turbulence and Combustion (ERCOFTAC), giving a valuable set of guidelines for CFD practitioners (Casey and Wintergerste, 2000).

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References

Casey, M. and Wintergerste, T. (Editors) (2000) *Best Practice Guidelines*, ERCOFTAC Special Interest Group on Quality and Trust in Industrial CFD.

Sørensen, D. N. and Nielsen, P. V. (2003) Quality control of computational fluid dynamics in indoor environments, *Indoor Air*, **13**, 2–17.