

GI

Gebäudetechnik in Wissenschaft & Praxis (Building Services Engineering in Science & Practice)



Author Guidelines Science

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The length of the article should not exceed 10 DIN A4 pages of a Word document (without images and tables).

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Please send the images and tables separately from the text in separate files.

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Examples for bibliographic references:

- [1] Schmidt, M. Kaschtschejewa, O. „Verbesserung der Raumluftqualität mittels einer schadstoffsenkenden Wand – Teil 1: Experimentelle Untersuchungen“, GI 2014, Bd. 135, Nr. 05, S. 280-289.
- [2] DIN EN 13779: Lüftung von Nichtwohngebäuden - Allgemeine Grundlagen und Anforderungen für Lüftungs- und Klimaanlageanlagen und Raumkühlsysteme; deutsche Fassung. Berlin : Beuth Verlag, 2007.
- [3] ANSYS FLUENT 14.0 Theory Guide, 2011.

Translations

We need English/German translations of the title and the abstract (summary).

Author Information

We need a short biography (tabular) and main area of expertise incl. academic title and year of birth (max. 300 characters per author) as well as the address (name of the company, postal address, phone number, email address) for the introduction of the author. In addition, we need a passport picture of you (in digital form, high-resolution).

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If you have any questions ...

Please contact:

Henriette von Feilitzsch

Head of Editorial Department

ITM InnoTech Medien GmbH

Bahnhofstraße 10

86150 Augsburg

Phone: +49 821 65 04 49-15

Mobile: +49 151 62453191

Fax: +49 821 65 04 49-99

Email: vonfeilitzsch@innotech-medien.de

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Guidelines for GI Authors

At a glance

Title

Summary/ Abstract: max. 800 characters incl. Blank spaces; no paragraphs.

English/ German Translation of the title and the abstract.

Images and tables with caption and image reference

Text

Conclusion at the end of the article

Bibliographic references

WISSENSCHAFT

Neue Möglichkeiten durch 3D-Ganzjahresgebäudeenergiesimulation

Der Gebäudeenergieverbrauch hat weltweit einen hohen Anteil am Primärenergieverbrauch, so dass die Berechnung des Gebäudeenergieverbrauchs eine der wichtigsten Aufgaben von Ingenieuren darstellt. Anders als in der Designphase eines Gebäudes, werden in der Berechnungsphase des Gebäudeenergieverbrauchs vorwiegend 1D-Methoden angewendet. Gleichzeitig kommt aufgrund der sehr schnellen Entwicklung von Computertechnik die numerische 3D-Simulationstechnik (3D) + Computergestützte Fluid Dynamik zunehmend bei detaillierten Lösungen von ingenieurwissenschaftlichen Problemen zum Einsatz.

New Opportunities Through 3D Annual Building Energy Simulation

The energy consumption of buildings constitutes a high percentage of the world's primary energy consumption, so that the calculation of building energy consumption is one of the most important tasks for engineers today. Unlike in the design phase, most dimensional methods are primarily used in the calculation phase of building energy consumption. At the same time, parallel to the rapid developments in computer science, three-dimensional computational fluid dynamics (3D) is increasingly used for detailed solutions of various engineering problems.

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TUNO ASKAN
MARTIN KRIEGL

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WISSENSCHAFT



5. Fazit

Die neuen Methoden der 3D-Ganzjahresenergiesimulation hat in den ersten zwei Fallstudien plausible Ergebnisse geliefert. Der etwa 40%ige Unterschied der Ergebnisse zwischen 1D- und 3D-Simulationen hat den ersten Fallstudien fast erreicht. Der Grund für diese Abweichung muss noch mithilfe von experimentellen Studien geklärt werden. Neben der theoretisch höheren Genauigkeit bietet diese neue Berechnungsmethode weitere Berechnungs- und Visualisierungsmöglichkeiten, wie zum Beispiel die transienten thermische Belastungsbewertung, die Lokalisierung von Nachschubströmen, sowie die lokale Optimierung. Außerdem ist es möglich, neben dem Energieeinsparpotenzial auch den Massentransport zu berechnen und damit z.B. die mögliche Schimmelbildung an Bauteilen zu identifizieren. Eine weitere wichtige Eigenschaft dieser Methode ist die Möglichkeit der Entwicklung von numerischen Wärmeverteilerkonzepten, welche das energetische Optimierungspotenzial einer 100%ig effizienten Wärmeverteilung darstellen und für die Auslegung eines Wärmeverteilsystems die Basis bilden kann. Der Einsatz von Co-Simulationen, welche auch mit 1D-Tools für Regelungslogiken durchgeführt werden können, ist bezüglich der Genauigkeit ein wichtiger Aspekt. Derzeitige Forschungsschwerpunkte dieser vorgestellten rechnerischen Methode liegen auf der Co-Simulation Energie- und Strömungssimulation, der Entwicklung rechnerischer Wärmeverteilerkonzepte sowie der Verbesserung der Parallelperformance der Berechnung. Die geplanten experimentellen Studien werden in naher Zukunft konkrete Ergebnisse über die Genauigkeit der 3D-Ganzjahresenergiesimulation liefern.

Literatur

[1] Bauwerks-Wärmeverteilerkonzepte, Feigler, J.-H., Pohl, M., 2008.

[2] Study of energy meter calibration data in Istanbul, Topcu, S., Özlü, S. and Akar, C., 1994.

[3] 3D Ganzjahresenergiesimulationen, Askan, T., Kriegl, M., EPF Tagung 2013.

[4] Annual Building Energy Simulation with Star-CCM+, Askan, T., Kriegl, M., Sci Global Conference 2014.

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Author information with passport photo and contact



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Your contact persons for
Editing and Media Consulting



PROF. DR.-ING. BERT OSCHATZ
Publisher / Editor in Chief
ITG Institute for Building Services
Engineering Dresden
Tiergartenstraße 54, 01219 Dresden
Phone: +49 351 4692 5474
Email: oschatz@itg-dresden.de



DR.-ING. HABIL. JOACHIM SEIFERT
Publisher / Editor in Chief
University of Applied Sciences Dresden
Institute of Power Engineering
Helmholtzstr. 14, 01069 Dresden
Merkel-Bau (MER), Room: 215
Phone: +49 351 463 34909
Email: joachim.seifert@tu-dresden.de



KIRSTIN SOMMER
CEO / Media Consulting
ITM InnoTech Medien GmbH
Bahnhofstraße 10, 86150 Augsburg
Phone: +49 821 65 04 49-50
Mobile: +49 171 10 53 094
Fax: +49 821 65 04 49-99
Email: ksommer@innotech-medien.de



HENRIETTE VON FEILITZSCH
Head of Editorial Department
ITM InnoTech Medien GmbH
Bahnhofstraße 10, 86150 Augsburg
Phone: +49 821 65 04 49-15
Mobile: +49 151 62 45 31 91
Fax: +49 821 65 04 49-99
Email: vonfeilitzsch@innotech-medien.de