**PROF. DR. IR. JEFREY I. KINDANGEN, DEA.**

# NATURAL VENTILATION

**From Computational Fluid Dynamics
To Artificial Neural Networks
For Thermal Comfort**

**Faculty of Engineering
Sam Ratulangi University Press**

*Natural Ventilation, From Computational Fluid Dynamics,*
*To Artificial Neural Networks, For Thermal Comfort*

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**Jefrey I. Kindangen** is Professor in Building Sciences, was born on June 3, 1965 in Manado (North Sulawesi). After finishing Senior High School in Manado, he studied Architectural Engineering at Sam Ratulangi University.

He joined the teaching staff of the Department of Architecture, Faculty of Engineering, Sam Ratulangi University, as soon as he graduated as an architect in 1989. He is member of Indonesian Architects Association (IAA)

He holds Master (DEA) in 1994 and Ph.D. in 1997 in Building Design and Urban Engineering from *Institut National des Sciences Appliquées* (INSA) de Lyon, France.

He was Head of Architectural Engineering Study Program of Sam Ratulangi University from 1999 to 2002 and Head of Department of Architecture Sam Ratulangi University from 2002 until 2006. He was awarded Best Lecturer from the Rector of Sam Ratulangi University and Directorate General of Higher Education (1998), one of finalist of Indonesian Young Researcher Selection from Indonesian Institute of Sciences (1999).

He actively participated in some international conferences: Passive and Low Energy Architecture in Louvain-la-Neuve, Belgium (1996), 2nd International Conference on Building and the Environment in Paris (1997), International Conference on Fluid and Thermal Energy Conversion in Yogyakarta (1997), CLIMA 2000 in Brussels (1998), Quality in Research FTUI in Jakarta (1999), The 6th International Seminar on Sustainable Environment and Architecture (SENVAR) in Bandung (2005), The 7th International Seminar on SENVAR in Makassar (2006) and 2nd International Networks of Tropical Architecture (iNTA) in Yogyakarta (2006).

He has already published some papers in International Scientific Journals: Building and Environment, Building Research and Information, Architectural Science Review and Révue Générale de Thermique.

# ACKNOWLEDGEMENTS

# PREFACE

Increasing demands for energy saving and a higher degree of comfort in rooms compels architects to use more sophisticated analysis methods.

This book will describe the cases for analysis of natural ventilation performance by making use of Computational Fluid Dynamics (CFD) codes and Artificial Neural Networks.

Firstly, this study will present the investigation of natural ventilation with Computational Fluid Dynamics. Secondly, it will attempt to formally investigate the effects of roof shapes on indoor airflow pattern. Thirdly, it will be presented the prediction of architectural element effects on interior air motion using Artificial Neural Networks. Fourthly, Artificial Neural Networks will be expanded to cover more problems such as the prediction of interior velocity coefficients. Finally, it will be studied the applicability of windows and roof configurations to comfort ventilation.

From the analysis in this study it can be seen that the use of some sophisticated analysis methods has many advantages, such as time saving, that has been shown to be a very promising technique and opens up an interesting field of investigation which they provide reliable results.

It is strongly suggested that the future work on this domain is needed to address the thermal comfort assessment.


Manado, February 2008

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