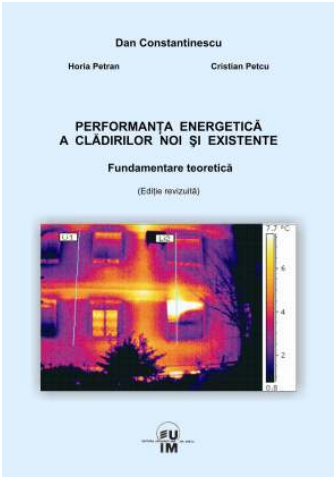

ENERGY PERFORMANCE OF NEW AND EXISTING BUILDINGS – THEORETICAL BASIS

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The purpose of the book is to present the theoretical bases of the activity of building auditing, **with reference to thermal processes.** The book presents the physical and mathematical support of the energy assessment, diagnosis, certification and auditing of new and existing buildings. The book is addressed to the researchers, design engineers and university professors in the field of civil engineering, building equipment and architecture. By presentation and contents, the book is useful also to graduate and postgraduate students, interested in becoming building energy auditors. The book is useful as well to those who wish to approach the new field of the energy design of buildings. Although the book is not a guideline for the calculation of the building energy performance, a chapter **(VIII)** was introduced, under the form of a **calculation worksheet**, in order to facilitat the software implementation of the calculation relationships presented in the Romanian regulations (to the development of those the authors have participated, and of those which have proven and still prove useful, presented in chapter VIII), as well as in the book.

By its contents and approach, the book represents a novelty for the technical literature in Romania. Connections with a discipline which undergoes deep reformation can be done, namely the “Building Thermotechnics”.

The bases of the present book were established by the research carried on in INCERC by the authors, starting with 1969. In 2000, the authors developed the first technical regulations concerning energy certification and auditing of Romanian buildings, known under the codified names of NP 048-2000, NP 047-2000 si NP 049-2000. The merit of the Romanian regulation is, in the first place, the one of having prefaced the European Directive 91 / 2002 / CE and then of having oriented towards a phenomenological approach which is often lacking to the methods recommended by certain European standards.

By approach and valuation, the book pertains to the “classical” methodic, specific to the thermodynamics of irreversible processes of the property transfer through building elements and through the components of the heating equipment. Also, the practice of over 7 years of energy certification and audit has demonstrated that the specialists wishing to familiarize with the complex calculation methods either would do that even if they are not architects, which are not supposed of using frequently the simulation methods, or would not do that even if they have graduated master or doctoral courses. The book is a possible alternative to the reformation of the technical regulation system but, more than that, a phenomenological introduction that benefits of the support of the experiment and of the reference modeling.

As compared to the 2008 edition, the book includes a new chapter, which refers to a **Quick Method** for the energy certification of existing residential buildings. The calculation algorithm presented into detail provides the possibility for the reader of building his own calculation worksheet (EXCEL), without using costly software that is most often not validated by the methods of physical and numerical experiment.

Practically, the book is written starting from the idea that developing an energy performance certificate or analyzing packages of technical solutions for energy rehabilitation of existing buildings, as well as conceiving a new energy-competing building, means using models of thinking having in common the quantitative simulation of the heat and mass transfer processes. The references specified in the book include publications of the authors, having as a purpose the deeper understanding of the physical phenomenon and of the methodological component, specific to the modeling of the property (mass and heat) transfer in buildings. The purpose of all these publications, perhaps complicated, especially from the point of view of the mathematical approach, is that of participating to that basic theoretical training without which the practical approach of a new discipline - extremely useful and necessary - **the energy and environmental design of buildings** - is not possible. The sustainable development, so often claimed during recent years as a landmark of construction, would not overcome the stage of technological enthusiasm without a right balance between the “causes and effects” laying in the intimacy of those complex structures named buildings. We hope that the present book, as well as those recommended in its references, will complete the library of the present and especially of the future specialist in the design of sustainable, beautiful and friendly buildings.

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