

STAGES OF APPLICATION OF THERMOPHYSICAL PROCESSES IN LIFE AND POSSIBILITIES IN THE ANSYS PROGRAM

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ABSTRACT: In this article, I covered thermophysical processes, physical phenomena related to the distribution of thermal energy between materials or between the material and its surrounding atmosphere. These processes are divided into types such as convection (heat spread by movement), conduction (heat spread by collision between materials) and radiation. The concept of thermophysical processes is widely used in practice in energy, environmental protection, metallurgy and a number of other fields. This annotation presents the basic concepts of thermophysical processes and their practical importance.

Key words: Convection, conduction, radiation, energy source, environmental protection, art and technology, solar cells, air conditioners, ANSYS.

INTRODUCTION

Thermophysical processes are phenomena related to the transfer of thermal energy to the composition, between materials, and between these materials and the atmosphere surrounding them. These processes can occur in any material and in any of its states (gas, liquid or solid).

In every external environment, we feel the effects of heat from auxiliary energy sources. We can see this through the rays of heat coming from the sun. These and many other phenomena reveal the categories of thermophysical processes.

MAIN PART

Convection: This is the diffusion of heat through the movement of a material. For example: When liquid water is heated, heat goes up and cold water goes down.

Conduction: It is the transfer of heat from one place to another between materials, but no movement of the material itself is observed.

Radiation: It is the propagation of heat through electromagnetic waves emitted from any object. The heat transferred from the sun to the earth arrives in the form of radiation.

The importance of thermophysical processes:

1. **Energy Source:** Any energy source, such as a nuclear reactor or a solar panel, is based on thermophysical processes.
2. **Save the Environment:** By correcting the heat, you can save the environment and affect global warming.
3. **Arts and Technology:** Thermophysical processes are important in a number of arts and technologies, such as metal smelting, power plants, and aerospace.

In addition, we can learn the full potential of thermophysical processes through the following programs.

ANSYS Fluent and ANSYS Thermal programs are widely used in solving problems related to thermophysical processes.

The main capabilities related to thermophysical processes in ANSYS are:

1. **Actions available or not available:** The program allows you to model the transfer of heat through small particles or fluids.
2. **Radiation and Heat Dissipation:** Heat dissipation by conduction, convection and radiation can be modeled using ANSYS.
3. **Material properties:** The material library provided in ANSYS software allows you to work with the thermophysical properties of various materials.
4. **Thermophysical processes:** ANSYS allows you to model heat moving in liquids or gases, heat conduction between materials, or radiant heat.
5. **Dissipated heat:** In ANSYS, you can calculate the heat dissipation or the heat generated by convection through gases or liquids.
6. **Thermal stress:** Stress acting on materials can also be modeled through thermophysical processes.

Using these capabilities, engineers and researchers use ANSYS to solve problems related to thermal protection, radiation, heat conduction, heat dissipation, and other thermophysical processes.

It is essential to use these capabilities of ANSYS to create a complete and accurate model related to thermophysical processes to solve engineering problems. However, it is necessary to acquire the necessary concepts and skills to use the program effectively.

ANSYS is well-known as a major engineering analysis software for accurate environment editing, simulation and design. Thermophysical processes are very important in ANSYS and are explained using its thermal analysis section.

ANSYS helps you learn the following processes to perform thermal analysis:

1. Heating (Thermal Loading): This process involves the organization of heat sources. For example, the temperature of an electric radiator or the heat radiation of the sun can be expressed in this process.
2. Heat Transfer: ANSYS transfers heat through 3 main methods: conduction (the transfer of heat from the material itself), convection (the movement of heat) and radiation (the transfer of heat through electromagnetic radiation).
3. Thermovisions: This part helps to create graphs and visualized data to show the material surface temperature, heat distribution and heat transfer.
4. Thermal Modeling (Thermal Modeling): ANSYS allows you to model and display any materials and structures according to their current thermal state. Based on this model, thermal properties of the material, temperatures and heat transfer are determined.
5. Analysis by parameters (Parametric Analysis): ANSYS allows studying the effect on a parameter, for example, increasing the temperature or changing the amount of heating part of the material. These analysis capabilities are used to further optimize the design.

ANSYS software is excellent for performing large-scale, efficient, and practically quality thermophysical simulations. This program is studied by engineers and designers to organize technical projects and deepen the thermophysical processes in them.

CONCLUSION

Thermophysical processes refer to the diffusion of heat between materials and the atmosphere surrounding them. They can occur in the form of convection, conduction and radiation. These processes are important in natural and artificial environments and are carried out in energy, environmental protection and a number of other fields. ANSYS is a powerful and intelligent program for accurately and efficiently modeling and analyzing thermophysical processes. This is very important for the accurate visualization and proper use of thermophysical processes in the fields of engineering and technical analysis.

LIST OF REFERENCES

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 - Basic concepts used in thermal analysis
 - Methods of modeling thermophysical processes
 - The main types of heat dissipation: conduction, convection and radiation.
2. Candle Tickoo. "ANSYS Workbench 2020: A Tutorial Approach". This book:
 - Access to the ANSYS Workbench interface

- Basic analysis categories, including thermal analysis

3. Lawrence J. Jansen. "Introduction to Thermal Systems Engineering: Thermodynamics, Fluid Mechanics, and Heat Transfer". This book helps to learn the basic environment editing theory when using ANSYS software.

4. Joshua Lawrence, Fereydoon Dadkhah. "Heat Transfer in ANSYS". This book discusses the theoretical and practical aspects of heat transfer in ANSYS.

5. ANSYS Learning Forum and ANSYS Customer Portal. It contains support services, information and tips created by ANSYS engineers and users. These resources offer advice and guidance on solving specific thermophysical issues with the product.