

# Heat transfer in porous media

- Heat transfer in porous media involves the movement of heat within materials containing voids, such as rocks or foam
- There are three primary modes of heat transfer: conduction, convection, and radiation
- In porous media, these processes often occur simultaneously and are influenced by the properties of both the solid matrix and the fluid in the pores
- Understanding this phenomenon is crucial in fields like geothermal energy, insulation technology, and chemical engineering

## Practical example: Nuclear reactors

- Heat transfer in porous materials is critical in nuclear reactors, particularly in the filtration and control of radioactive gases and fluids
- Porous materials in reactors help manage heat by allowing coolant fluids to pass through them, effectively reducing the reactor's temperature
- The nature of the porous structure facilitates a large surface area for heat exchange, enhancing the reactor's safety and efficiency
- This principle ensures that the reactor operates within safe thermal limits, preventing overheating and potential meltdowns



# Principles Of Heat Transfer In Porous Media

**Massoud Kaviany**



## **Principles Of Heat Transfer In Porous Media:**

**Principles of Heat Transfer in Porous Media** M. Kaviany, 2012-12-06 Although the empirical treatment of fluid flow and heat transfer in porous media is over a century old only in the last three decades has the transport in these heterogeneous systems been addressed in detail So far single phase flows in porous media have been treated or at least formulated satisfactorily while the subject of two phase flow and the related heat transfer in porous media is still in its infancy This book identifies the principles of transport in porous media and compares the available predictions based on theoretical treatments of various transport mechanisms with the existing experimental results The theoretical treatment is based on the volume averaging of the momentum and energy equations with the closure conditions necessary for obtaining solutions While emphasizing a basic understanding of heat transfer in porous media this book does not ignore the need for predictive tools whenever a rigorous theoretical treatment of a phenomena is not available semi empirical and empirical treatments are given Principles of Heat Transfer in Porous Media Massoud Kaviany, 1991-01-01 **Principles of Heat**

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number of engineering and natural flows This new edition features a completely updated text including two new chapters exploring Turbulent Combustion and Moving Porous Media De Lemos has expertly brought together a text that compiles details compares and evaluates available methodologies for modelling and simulating flow providing an essential tour for engineering students working within the field as well as those working in chemistry physics applied mathematics and geological and environmental sciences Brings together groundbreaking and complex research on turbulence in porous media Extends the original model to situations including reactive systems Now discusses movement of the porous matrix

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