1. Record Nr. UNINA9910462542503321 Autore Gaskell David R. **Titolo** An introduction to transport phenomena in materials engineering / / David R. Gaskell Pubbl/distr/stampa New Jersey: ,: Momentum Press, LLC, , 2012 **ISBN** 1-283-89611-7 1-60650-357-X Edizione [Second edition.] Descrizione fisica 1 online resource (686 p.) Disciplina 660.28423 Soggetti Mass transfer Materials - Fluid dynamics Electronic books. Lingua di pubblicazione Inglese **Formato** Materiale a stampa Livello bibliografico Monografia Note generali Includes index. Nota di bibliografia Includes bibliographical references (p. 642-643) and index. Nota di contenuto List of symbols --1. Engineering units and pressure in static fluids -- 1.1 Origins of engineering units -- 1.2 Concept of pressure -- 1.3 Measurement of pressure -- 1.4 Pressure in incompressible fluids -- 1.5 Buoyancy --1.6 Summary -- Problems --2. Momentum transport and laminar flow of Newtonian fluids -- 2.1 Introduction -- 2.2 Newton's lax of viscosity -- 2.3 Conservation of momentum in steady-state flow -- 2.4 Fluid flow between two flat parallel plates -- 2.5 Fluid flow down in inclined plane -- 2.6 Fluid flow in a vertical cylindrical tube -- 2.7 Capillary flowmeter -- 2.8 Fluid flow in an annulus -- 2.9 Mean residence time -- 2.10 Calculation of viscosity from the kinetic theory of gases -- 2.11 Viscosities of liquid metals -- 2.12 Summary -- Problems --3. Equations of continuity and conservation of momentum and fluid flow past submerged objects -- 3.1 Introduction -- 3.2 Equation of continuity -- 3.3 Conservation of momentum -- 3.4 Navier-Stokes

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Sommario/riassunto

In their classic text, Transport Phenomena, Bird, Stewart, and Lightfoot state their opinion that the subject of transport phenomena should rank along with thermodynamics, mechanics, and electromagnetism as one of the "key engineering sciences." This thought was not shared by many traditional metallurgists, and diffusion in the solid state was the only aspect of transport phenomena included in many traditional university metallurgy curricula. However, as metallurgists transformed themselves into materials scientists and engineers, and the artificial barriers between the various engineering disciplines were lowered, the materials engineers began to see the truth in the opinion of Bird, Stewart, and Lightfoot. The major difference, however, between the first and this edition is that this edition contains an additional chapter, Chapter 12, titled "Boiling and Condensation." The material presented in this chapter is particularly important in view of the current interest in Renewal Energy Resources involving such devices as windmills and solar panels. Developments in this field require a thorough familiarity with the phenomena and mechanisms of boiling and condensation.