1.

Record Nr.	UNINA9910809240503321
Autore	Prud'homme Roger
Titolo	Flows and chemical reactions in homogeneous mixtures / / Roger Prud'homme
Pubbl/distr/stampa	Hoboken, NJ : , : ISTE Ltd/John Wiley and Sons Inc, , 2013
ISBN	1-118-83266-3 1-118-83265-5 1-118-83262-0
Descrizione fisica	1 online resource (249 p.)
Collana	Fluid mechanics series
Disciplina	249
Soggetti	Chemical reactions Fluid mechanics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Cover; Title Page; Contents; Symbols; Preface; Chapter 1. Flows in Nozzles; 1.1. Sound propagation in the presence of chemical reactions; 1.1.1. Thermodynamic considerations; 1.1.2. Sound propagation in a mono-reactive medium; 1.1.3. Sound propagation in a multi-reactive medium; 1.2. Relaxed flows in nozzles; 1.2.1. Calculation of a continuous flow with a recombination-dissociation reaction in a de Laval nozzle; 1.2.2. Asymptotic study of the transonic zone of a continuous monodimensional flow in a de Laval nozzle; 1.3. Flows in thermal and chemical non-equilibrium 1.3.1. Balance equations and closure relations in the presence of thermal and chemical non-equilibria1.3.2. Application; 1.4. Conclusion about flows in nozzles; Chapter 2 . Chemical Reactors; 2.1. Ideal reactors, real reactors, balance equations; 2.1.1. Ideal chemical reactors; 2.1.2. Balance equations for chemical reactors; 2.2. Perfectly mixed homogeneous chemical reactors; 2.2.1. Equations for a perfectly stirred homogeneous chemical reactor; 2.2.2. Steady regimes in perfectly stirred homogeneous chemical reactors 2.2.3. Stability of operating points in the perfectly stirred homogeneous chemical reactor2.3. Tubular reactor; 2.3.1. Plug flow reactor; 2.3.2. Reactor with axial mixing; 2.3.3. Reactor with radial mixing; 2.4. Residence time distribution; 2.4.1. Balance equations; 2.4.2. Perfectly

stirred homogeneous reactors in a steady regime; 2.4.3. Plug flow reactors; 2.4.4. Poiseuille flow; 2.4.5. Real reactors; Chapter 3. Laminar and Turbulent Flames; 3.1. Laminar premixed combustion; 3.1.1. Rankine-Hugoniot theory; 3.1.2. Velocity and structure of the plane adiabatic laminar and steady premixed flame
3.1.3. Other examples of a steady laminar premixed flame3.2. Laminar non-premixed combustion; 3.2.1. Burke-Schumann problem; 3.2.2. Other examples of diffusion flames; 3.3. Turbulent combustion; 3.3.1. Averaged balance equation for turbulent combustion; 3.3.2. Premixed turbulent combustion regimes; 3.3.3. Non-premixed turbulent combustion regimes; 3.3.4. Models of turbulent combustion; 3.3.5. LESs in combustion; 3.3.6. Triple flames; Appendices; Appendix 1. Dimensionless Numbers, Similarity; A1.1. Fundamentals of dimensional analysis: i groups; A1.1.1. Basic considerations
A1.1.2. Vaschy-Buckingham theorem (1890) or theoremA1.1.3. Practical advantage to dimensional analysis; A1.1.4. Example of application: head loss in a cylindrical pipe; A1.2. Similarity; A1.2.1. Definition; A1.2.2. Application: condition of similarity in a soft balloon placed in a current of air with a given velocity; A1.3. Analytical searching for solutions to a heat transfer problem (self-similar solution); A1.4. Some dimensionless numbers; Appendix 2 . Thermodynamic Functions; A2.1. General points; A2.2. Translational motion; A2.3. Internal motions; A2.3.1. Monatomic species
A2.3.2. Diatomic species

| Sommario/riassunto | Flows with chemical reactions can occur in various fields such as combustion, process engineering, aeronautics, the atmospheric environment and aquatics.The examples of application chosen in this book mainly concern homogeneous reactive mixtures that can occur in propellers within the fields of process engineering and combustion:- propagation of sound and monodimensional flows in nozzles, which may include disequilibria of the internal modes of the energy of molecules;- ideal chemical reactors, stabilization of their steady operation points in the homogeneous case of a perfec |