

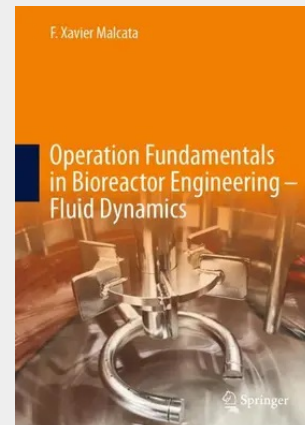
Operation Fundamentals in Bioreactor Engineering - Fluid Dynamics

This textbook covers essentials of and auxiliary operations necessary to operate a bioreactor where living cells are utilized as biocatalysts. Particular attention is given to the dynamic behavior of fluids within bioreactors and support equipment, thus offering a comprehensive treatment of fluid flow, pumping, flow manipulation and metering, and mixing—covering both Newtonian and non-Newtonian systems, as well as heterogeneous flow around gaseous bubbles and solid particles.

A pragmatic and systematic approach is provided to all such topics, from the point of view of a biological engineer – illustrated by selected and carefully solved problems, proposed at the end of each section. Mathematical derivations are put forward that are easy to follow step-by-step – even by students holding only elementary mathematical and biochemical backgrounds; and are developed at a pace suitable for self-learning. Furthermore, the functional forms and meanings of the expressions produced are explored, and the final germane formulae are duly highlighted and graphically interpreted in dimensionless form – to facilitate the perception of major trends and asymptotic patterns. Therefore, this textbook offers a valuable resource for both instructors and undergraduate/graduate students – as an aid to grasp and relate basic physicochemical concepts underlying the actual operation of bioreactors, rather than conveying mere descriptions and empirical correlations.

This textbook and the companion volumes “Fundamentals of Biocatalysts: Cell Structure and Function”, “Operation Fundamentals in Bioreactor Engineering – Medium Handling” and “Modelling Fundamentals in Bioreactor Engineering” fill the gap between qualitative approaches focused on biochemistry, on the one hand; and technological approaches resorting to correlations that hardly convey a fundamental understanding of first principles, on the other.

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