Preface

The metal wastage design guidelines for fluidized beds given in this book identify relationships between metal wastage and (1) design parameters such as tube size, tube spacing and pitch, tube bundle and fluidized-bed height to distributor, and heat exchanger tube material properties, and (2) operating parameters such as fluidizing velocity, particle size, particle hardness, and angularity. The guidelines presented are of both a quantitative and qualitative nature. Simplified mechanistic models are described which account for the essential hydrodynamics and metal wastage processes occurring in bubbling fluidized beds. The empirical correlative approach complements the use of these models in the development of these design guidelines. Data used for model and guideline validation are summarized and referenced. Sample calculations and recommended design procedures are included. The influences of dependent variables on metal wastage such as solids velocity, bubble size, and in-bed pressure fluctuations are discussed.

The objectives of this book on metal wastage are to (1) provide physical insights into correlation development, (2) develop a database of experimental findings, (3) provide critical evaluations of correlations, and (4) develop designer-friendly procedures using simplified and realistic models and correlations.

This book distills the details of the modeling effort down to simplified mechanistic models leading to the development of guidelines for the design, operation, and scale up of bubbling atmospheric fluidized-bed combustors (FBCs) having minimum erosion. These simplified models capture the essence of the detailed computer models and, as such, represent easy-to-use tools that designers may apply to understand the influence of various operating and design parameters on erosion. Complementing these models is the correlative approach, which is also described. The format of this book is presented in such a form as to facilitate easy revisions in future editions to accommodate additional information.

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