
W4: Optimization and Uncertainty Analysis for Designing and Improving Flotation Circuits

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Mineral flotation is a multi-stage process that operates in interconnected circuits. For the past two decades, we have studied the impact of flotation circuits on both metallurgical performance and the economics of the mining industry. In this workshop, we will start with a brief introduction to flotation circuits. We will then explore how to design these circuits and examine the effects of stochastic and epistemic uncertainty on their design and performance. Finally, we will discuss how to identify bottlenecks and critical variables that can enhance the efficiency of these circuits. Our analysis will encompass both monometallic and polymetallic circuits.

Contents

1. Introduction to Flotation Circuits and Their Functionality.
2. Designing a Flotation Circuit Using Optimization Techniques.
3. Impact of Epistemic Uncertainty on Flotation Circuit Design.
4. Impact of Stochastic Uncertainty on Flotation Circuit Design.
5. Enhancing the Performance of Flotation Circuits.
6. Application of Techniques to Polymetallic Ores.

Dr. Luis Cisternas holds a Ph.D. in Chemical Engineering from the University of Wisconsin-Madison (USA). Professor Cisternas has also served as a visiting professor at several institutions, including CAPEC at DTU in Denmark, Aalto University in Finland, IRME at the Université du Québec en Abitibi-Témiscamingue in Canada, and Wuhan University of Technology in China. His research focuses on developing systematic tools (computer-aided) and experimental methods to address issues within the mining industry. These issues can be categorized into several topics: modeling, design, and optimization of mineral processes; the use of seawater in mining, and froth flotation. Professor Cisternas serves as the Associate Editor of the Green and Smart Mining Engineering Journal (KeAi Publishing). He is also a member of the Editorial Boards of Mineral Processing and Extractive Metallurgy Review (Taylor & Francis), Minerals (MDPI), International Journal of Mining Science and Technology (Elsevier), and Minerals and Mineral Materials (OAE Publishing Inc). He has authored over 160 peer-reviewed journal articles listed in the Web of Science, more than 100 conference papers, over 35 book chapters, and nine books.