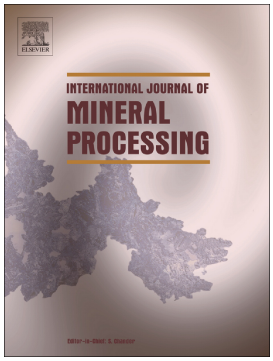

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A Methodology for the Conceptual Design of Flotation Circuits by Combining Group Contribution, Local/Global Sensitivity Analysis, and Reverse Simulation

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ABSTRACT

A methodology for the conceptual design of concentration circuits is presented. The methodology considers three decision levels: level I – the definition and analysis of the problem, level II – the synthesis and screening of alternatives, and level III – the final design. Level I allows setting up the problem and defining the design goals. In level II circuit alternatives are generated and evaluated using a group contribution method. Also, level II is complemented by a database that helps to select the most suitable circuit. In level III the design of each process stage is performed for the alternatives identified in level II. This final design is performed using local/global sensitivity analysis and reverse simulation. The method is illustrated with examples that demonstrate that the method is suitable for these types of problems.

Keywords: process design, global sensitivity analysis, reverse simulation, group contribution, flotation circuits, concentration plants.

1. Introduction

Mineral-concentration processes use various stages of concentration, forming a circuit because it is not possible to achieve the separation of the value species from the gangue in a single stage. The current practice for the design of these circuits is based on seven steps (Harris et al., 2002): (1) mineralogical examination in conjunction with a range of grinding tests, (2) a range of laboratory-scale batch tests and locked-cycle tests, (3) a circuit design

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