Froth flotation with drainage: model and numerical solution.

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Abstract

Froth flotation is a common unit operation used in mineral processing to separate valuable mineral particles from worthless gangue particles in finely ground ores. In it, the valuable mineral particles attach to bubbles of air that rise to the top of the column where they are removed, while the gangue particles settle to the bottom of the tank and are removed. For the efficiency of the process, it is important that a layer of froth develops near the top of the column. This froth layer works as a filter enhancing the separation process but also reduces the amount of water present in the effluent.

In this talk, we will focus on a model for froth flotation introduced in [1], that includes the drainage of liquid occurring at the top of the column, where a froth layer rich in valuable minerals is created. We will detail the construction of steady-state solutions and provide algebraic equations and inequalities that establish the dependence of steady states on the input and control variables. Finally, we will present some results that show the ability of the model to capture steady operation of the flotation device.

References

[1] Bürger, R., Diehl, S., Martí, M.C., Vásquez, Y., A degenerating convection-diffusion system modelling froth flotation with drainage. *IMA J. Appl. Math.*, 87: 1151–1190, 2022.

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