

Title Fluid Dynamic Analysis of the Solid–liquid Separation Process by Centrifugation
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Abstract

In this paper, a theoretical analysis and preliminary experimental trials of the solid–liquid separation process by centrifugation has been carried out to evaluate the modifications which would improve the performance of the centrifuge.

A new dimensionless number, the drag number d_r , has been defined as the ratio between the mean settling time of the smallest particles and the mean drag time necessary to remove all the settled solids.

A high drag number for the centrifugal extraction of olive oil allows the transition zone between the two main directions of the fluid motion to reach the oil layer. Consequently, it is important to avoid this interaction, otherwise a mixing between water and oil will occur. In this case, it is necessary to correctly evaluate the optimal value of the drag number in order to leave a thick water layer over the sediment.

Finally, it is pointed out that about 75% of the solids present in the olive paste, used in preliminary experimental trials, settle almost immediately, close to the feed opening. This tendency was avoided by allowing the differential velocity to vary as a function of the characteristics of the olive paste and/or by using barriers correctly located near the feed opening.