Optimization of a hydrodynamic separator using a multi-scale computational fluid dynamics approach

Vivien Schmitt[1] , Matthieu Dufresne[1], José Vazquez[1], Martin Fischer[1], Antoine Morin[2]

[1] Fluid and Solid Mechanics Institute (CNRS, University of Strasbourg, ENGEES, INSA), 2 rue Boussingault, 67000 Strasbourg, France, vivien.schmitt@engees.unistra.fr
[2] Hydroconcept, ZA Trappes Elancourt, 46 Avenue des frères Lumière, 78190 Trappes, France

ABSTRACT

This article deals with the optimization of a hydrodynamic separator working on the tangential separation mechanism along a grid. The aim of this study is to optimize the shape of the device in order to avoid clogging. A multi-scale approach is used. This methodology combines measurements and Computational Fluid Dynamics (CFD). A local model enables us to observe the different phenomena occurring at the orifice scale, which shows the interest of expanded metal grids. A global model is used to simulate the flow within the device using a conceptual model of the grid (porous wall). After validation against the experimental measurements, the global model was used to investigate the influence of deflectors and disk plate in the structure.

KEYWORDS

computational fluid dynamics, experiments, hydrodynamic separator, multi-scale approach