Design of internal structures for preventing sedimentation of microalgae in open raceway pond

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Microalgae have drawn attention due to its potential as an alternative energy source. Usually, microalgae are cultivated in the open raceway pond for mass production. For microalgae to be exposed sunlight, adequate mixing should be maintained in the raceway pond. There have been several attempts to enhance vertical mixing by imposing internal structures. However, internal structures may increase sedimentation of microalgae in consequence of decreased flow velocity. In this study, we suggest various internal structures, with different shapes and locations, to reduce sedimentation. Through this strategy, microalgae are expected to have more chance to receive sunlight and therefore, the productivity of microalgae can be enhanced. Numerical simulation of fluid flow in the open raceway pond was carried out with commercial computational fluid dynamic (CFD) software. In addition, we show experimental results about fluid flow in the lab-scale open raceway pond to verify our simulation results.