Abstract Submitted
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Modeling and simulation of microalgae derived hydrogen production in compact large scale photobioreactors[1] JOSE VARGAS, Florida State University, FERNANDO DIAS, Idaho National Laboratory, ANDRE MARIANO, WELLINGTON BALMANT, MARCOS ROSA, DAIANI SAVI, VANESSA KAVA, CHIRLEI GLIENKE, Federal University of Parana, JUAN ORDONEZ, Florida State University — This study predicts microalgae derived hydrogen production in compact large scale photobioreactors (PBR). A transient mathematical model for the cultivation medium is developed. The tool determines the whole system temperature, and mass fractions distribution. A mathematical correlation is proposed to calculate the resulting effect on H_2 production rate after genetically modifying the microalgae species. An indigenous microalgae strain was selected to be robust under different weather conditions. This strain was identified through rDNA sequence analysis, including ITS1, 5.8S and ITS2 (Internal Transcribed Spacer). The ITS analysis showed no genetic divergence between the utilized strain and *Acutodesmus obliquus*. A coarse mesh was used (6048 volume elements) to obtain results for a large compact PBR (2m x 5m x 8m). The largest computational time required for obtaining results was 560 s. The numerical results for the wild species microalgal growth are validated by direct comparison to experiments. Tests were conducted in the laboratory to assess H_2 production model numerical results, which are in good qualitative agreement with measurements. Therefore, the model could be used as an efficient tool for H_2 production PBR systems design and control.

[1]CNPq

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