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SEDIMENTATION AND MIXING ANALYSIS IN CATTLE MANURE FEEDSTOCK IN A STIRRED TANK OF ANAEROBIC DIGESTION

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It is necessary to move towards renewable energy resources, since the human has faced through global warming and fossil fuels depletion. Additionally, the livestock, agricultural and industrial activities have leaded to contamination of water, soil and atmosphere. With this in mind, anaerobic digestion (AD) is recognized as a cheap and easy approach for eliminating organic harmful materials, as well as generating energy. In the present study, an anaerobic digestion tank specialized for cattle manure was analyzed. Computational fluids dynamics (CFD) method was employed to estimate the behavior of the cattle manure feedstock, while agitating. Mixing, as well as sedimentation quality, was evaluated with respect to the concentration of the total solids in the fluid, which affected the rheological (non-Newtonian) characteristics of the feedstock. The sedimentation of soil within the digesting tank was simulated *via* discrete phase model (DPM) and velocity gradient method. ANSYS Fluent commercial code was utilized to solve continuity and Navier-Stokes, as well as turbulence, equations. The solver was steady state while analyzing both the mixing quality and sedimentation. By evaluating the achieved velocity and pressure fields, it is concluded that the mixing quality is appropriate for all the models with feedstock with total solid concentrations of 2.5% to 12.1%. However, the mixer is not efficient enough to avoid sedimentation. Finally, some recommendations for simulating the chemical reactions are presented for the future studies.

Recent Publications

1. **Nazari Kudahi S, Noorpoor A R and Mahmoodi N M (2017) Determination and analysis of CO_2 capture kinetics and mechanisms on the novel graphene-based adsorbents. Journal of CO_2 Utilization 21:17-29.**
2. **Asgari S, Noorpoor A R and Boyaghchi F A (2017) Parametric assessment and multi-objective optimization of an internal auto-cascade refrigeration cycle based on advanced exergy and exergoeconomic concepts". Journal of Energy 125:576-590.**
3. **Noorpoor A R and Rohani S (2016) Thermo-economics analysis and evolutionary-based optimisation of a novel multi-generation waste heat recovery in the cement factory. Int. Journal of Exergy 21:405-434.**
4. **Noorpoor A R and Nazari Kudahi S (2016) Analysis and study of CO_2 adsorption on UiO-66/graphene oxide composite using equilibrium modelling and ideal adsorption solution theory (IAST). Journal of Environmental Chemical Engineering 4:1081-1091.**
5. **Noorpoor A R and Nazari Kudahi S (2015) CO_2 emissions from Iran's power sector and analysis of the influencing factors using the stochastic impacts by regression on population, affluence and technology (STIRPAT) model. Journal of Carbon Management 6:101-116.**

Biography

Alireza Noorpoor was born 1974. In 1992, He moved to Mazandaran University for BSc in Mechanical Engineering (Fluid Mechanics) and graduated BSc in 1996 as top student of department. He continued in M.Sc. from 1997 to 1999. He has completed his PhD at the age of 30 years from Iran University of Science and Technology (IUST) and started to teaching at IUST. In 2010 he moved to University of Tehran. Now, he is associate Professor of Graduate Faculty of Environment at University of Tehran. He is the head of Air Pollution and Energy Systems Research Group (FANPAYA Co.) and Editor-in-Chief Journals: Solar Energy Research (JSER) and Environmental Sciences Studies (JESS). His interest fields are: Computational Fluid Dynamics (CFD), Air Pollution, Bio-gas, Carbon Capture and Energy Systems Engineering. He has published more than 200 papers in journals and conferences. He has held more than 10 International conferences at University of Tehran.

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