Article Abstract

Title:	**Design characteristics of Curved Blade aerator w.r.t. aeration efficiency and overall oxygen transfer coefficient and comparison with CFD modeling**
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Journal:	*International Journal of Engineering, Science and Technology*, Vol. 1, No. 1, 2009, pp. 1-15.
Abstract:	The main objective of this work is to design a high efficiency curved-blade-surface mechanical aerator for oxidation ditch, which is used to treat municipal and domestic sewage. Aeration experiments were conducted in oxidation ditch made up of mild steel sheets to study the design characteristics of curved blade surface mechanical aerator. The paper critically examines six different configurations of aerators, which were developed, fabricated and tested in the laboratory for its various dynamic parameters, such as diameter of aerators (D), speed (N) and immersion depth (h). Out of the different configurations tested, the curved blade rotor (CBR) emerged as a potential aerator with blade tip angle of 47°. The overall oxygen transfer co-efficient (K_La) was observed to be as high as 10.33 h^{-1} and the optimum aerator efficiency (AE) was found to be 2.269 kgO_2/kWh. The standard aeration efficiency (SAE) of CBR was observed to be higher as compared to other aerators used for oxidation ditch process. Dimensional analysis was used to develop equations that describe the aerator's behavior. Further, a CFD model is also developed for better understanding of the process that takes place inside the ditch. To prepare it 3D and steady flow, k-e turbulence model of flow was used and the simulation runs were carried out for one phase model to generate the data so as to compare it with experimentally observed values.
Keywords:	Oxidation ditch, dissolved oxygen, aerator, overall oxygen transfer coefficient, aeration efficiency, CFD