

Multi-Linear Regression Based Prediction of Mass Transfer by Multiple Plunging Jets

Authors : S. Deswal, M. Pal

Abstract : The paper aims to compare the performance of vertical and inclined multiple plunging jets and to model and predict their mass transfer capacity by multi-linear regression based approach. The multiple vertical plunging jets have jet impact angle of $\theta = 90^\circ$; whereas, multiple inclined plunging jets have jet impact angle of $\theta = 60^\circ$. The results of the study suggests that mass transfer is higher for multiple jets, and inclined multiple plunging jets have up to 1.6 times higher mass transfer than vertical multiple plunging jets under similar conditions. The derived relationship, based on multi-linear regression approach, has successfully predicted the volumetric mass transfer coefficient (KLa) from operational parameters of multiple plunging jets with a correlation coefficient of 0.973, root mean square error of 0.002 and coefficient of determination of 0.946. The results suggests that predicted overall mass transfer coefficient is in good agreement with actual experimental values; thereby suggesting the utility of derived relationship based on multi-linear regression based approach and can be successfully employed in modelling mass transfer by multiple plunging jets.

Keywords : mass transfer, multiple plunging jets, multi-linear regression, earth sciences

Conference Title : ICEES 2014 : International Conference on Environmental and Earth Sciences

Conference Location : Miami, United States

Conference Dates : March 10-11, 2014