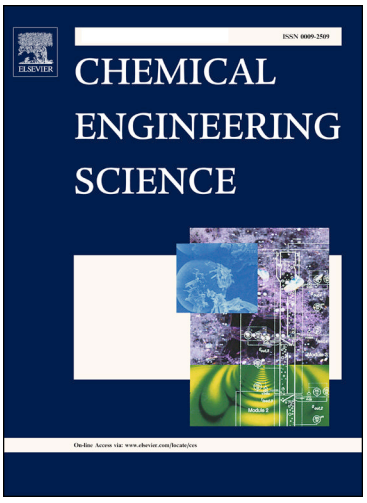

Numerical study of fog formation around Ambient Air Vaporizers

Divyamaan Wadnerkar, Biao Sun, Ranjeet P. Utikar, Geoffrey Evans, Moses O. Tade, Neil Kavanagh, Solomon Faka, Vishnu K. Pareek

PII: S0009-2509(17)30773-X
DOI: https://doi.org/10.1016/j.ces.2017.12.036
Reference: CES 13971

To appear in: *Chemical Engineering Science*

Received Date: 6 September 2017
Revised Date: 8 December 2017
Accepted Date: 17 December 2017

Please cite this article as: D. Wadnerkar, B. Sun, R.P. Utikar, G. Evans, M.O. Tade, N. Kavanagh, S. Faka, V.K. Pareek, Numerical study of fog formation around Ambient Air Vaporizers, *Chemical Engineering Science* (2017), doi: https://doi.org/10.1016/j.ces.2017.12.036

Numerical study of fog formation around Ambient Air Vaporizers

Divyamaan Wadnerkar[1], Biao Sun[1], Ranjeet P. Utikar[1], Geoffrey Evans[3], Moses O. Tade[1], Neil Kavanagh[2], Solomon Faka[2], Vishnu K. Pareek[1]

[1]Department of Chemical Engineering, Curtin University, Perth, WA 6102

[2]Woodside Energy Limited, Perth, WA 6000

[3]Department of Chemical Engineering, The University of Newcastle, NSW 2308

Abstract

Ambient air vaporizers (AAVs) are used to re-gasify cryogenic industrial gases for distribution and use. Although AAVs have low carbon footprint, fog formation around the ambient air vaporizers is a common problem, thus often leading to reduced visibility. Moreover, since AAVs exchange the heat from the surrounding air, the efficiency of the process is also at stake due to possible recycling of exiting air. Thus, simulating fog formation, dispersion and dissipation around AAVs is of critical importance. So far most of the studies for AAV consider fog in single phase framework, which are incapable of simulating the dispersion and dissipation of fog accurately. In this study, multiphase model of fog formation and dissipation has been developed considering the thermodynamics and heat transfer effects. The models have been validated using available wind tunnel data for a velocity and temperature field around a sample obstacle. A parametric study has been also presented to demonstrate the effect of wind velocity, AAV inlet air velocity and number of AAV units on the ambient conditions. The study provides an in-depth insight of the process and presents an analysis of operating conditions suitable for AAVs.

Keywords: Ambient Air Vaporizers, Multiphase CFD, Fog, LNG