Accepted Manuscript

Title: Explosion Flame Acceleration over Obstacles: Effects of Separation Distance for a Range of Scales

Authors: A.M. Na'inna, H.N. Phylaktou, G.E. Andrews

PII: S0957-5820(17)30024-1

DOI: http://dx.doi.org/doi:10.1016/j.psep.2017.01.019

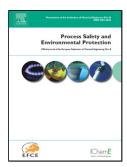
Reference: PSEP 959

To appear in: Process Safety and Environment Protection

Received date: 5-9-2016 Revised date: 14-1-2017 Accepted date: 22-1-2017

Please cite this article as: Na'inna, A.M., Phylaktou, H.N., Andrews, G.E., Explosion Flame Acceleration over Obstacles: Effects of Separation Distance for a Range of Scales.Process Safety and Environment Protection http://dx.doi.org/10.1016/j.psep.2017.01.019

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Explosion Flame Acceleration over Obstacles: Effects of Separation Distance for a Range of

Scales

A.M. Na'inna^{a*}, H.N. Phylaktou^b, and G.E. Andrews^b

*a Armament Engineering Department, Nigerian Air Force Institute of Technology, Kaduna, Nigeria

^bEnergy Research Institute, University of Leeds, Leeds, United Kingdom, LS2 9JT

* Corresponding Author. Tel: +2348030679898

Email address: abdulmajid.nainna@airforce.mil.ng; amnainna@gmail.com

HIGHLIGHTS

1. A dependence of overpressure and flame speed on the obstacle scale agrees with a square

relationship between them.

The maximum overpressure and flame speed increased with reduction in number of flat-bars. 2.

3. The worst case obstacle spacing increase with increase in obstacle scale.

4. The average value of S_T/S_L obtained is similar to that from the analysis of some real gas

explosion incidents.

Abstract

The influence of obstacle separation distance on explosion flame acceleration was studied for 10%

methane-air mixtures using two 20% blockage obstacles with variable number and width of bars

(variable obstacle length scale) were investigated in a 162 mm diameter 4.5 m long tube with

ignition on the centre of the closed end and flame propagation towards the open end. The spacing

between the obstacles was varied from 0.25 m to 2.75 m. It was observed that the maximum

overpressure and flame speed increased with the reduction in number of flat-bars (i.e. with

increasing obstacle length scale). A maximum overpressure of 129 kPa at 2.25 m obstacle spacing

was achieved with 1-flat-bar obstacles, followed by 118 kPa and 110 kPa for 2 and 4-flat-bars

respectively at 1.25 m and 0.5 m obstacle separation. Turbulent to laminar burning velocity ratios

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