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NEW TOOLS FOR ESTIMATING THE EXTENT OF HAZARDOUS AREAS GENERATED BY GAS LEAK EXPLOSIONS

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Abstract

The current paper is an overview on previous and ongoing research carried out by the authors concerning the use of Computational Fluid Dynamics for the accurate classification of hazardous Ex areas generated by flammable gases, for the optimization of computational simulation of air-methane mixture explosions by using ANSYS CFX and FLUENT and for calibrating computational simulations of gas explosions using the Schlieren effect. These research works containing analytic studies have led to the observation of basic principles which come to support the benefit of computational approaches for estimating gas dispersion within technological installations in which are handled or stored flammable materials and in which there are likely to occur explosive atmospheres. Preliminary results have led to the idea of developing a computational method for assessing the hazardous area extent in case of gas leak explosions in confined spaces. The computational method intended to be developed has to be validated in the lab using an experimental chamber as domain for analysing accidental flammable gas leaks from transportation installations and for studying the formation, ignition and burning of air-flammable gas mixtures in confined spaces. Results obtained from physical experiments will be used for calibrating the mathematical models. Further, verification and validation of computational simulations carried out based on physical experiments will be performed by a comparative analysis of virtual results with the experimental ones. In the end, the mathematical model will be implemented on a small-scale reproduction of a confined industrial area with explosion hazard.

Key words: computational method, confined space, explosion, extent, gas leak, hazardous area

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