EVALUATION OF DISPAL CFD MODEL AGAINST PRAIRIE GRASS AND KIT FOX FIELD DATASET

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Computational Fluid Dynamics (CFD) models using RANS approach are now extensively used for simulating dispersion processes within array of obstacles such as urban or plant areas. However, there is a need of validation and evaluation to guarantee the consistency and the quality of the models. Hence, a validation stage is required prior to apply dispersion models and deliver risk studies for regulatory purposes. In that way, several extensive field observations have been identified and recommended in the literature, combined with guidelines to post-process the results and define performances measures. This work proposes two exercises of validation which have been carried out in order to evaluate DISPAL CFD code. This model is developed by Air Liquide R&D Modeling Team and used for risk assessment studies on its installations and equipments. The first experimental campaign is the well-known Prairie Grass Project dealing with the open-field dispersion of a ground passive tracer on a flat terrain. The second one is the Kit Fox Field experiment which handles the dispersion of a

CO2 dense gas cloud on a non-uniform rough area typical of industrial process plant. The emphasis has been put on the modelling of stable and very stable surface layers, since these atmospheric conditions, associated with low wind speed, are the most common conditions encountered for risk assessment. Hence, neutral to very stable conditions trials have been reproduced for both dataset. The evaluation process uses the methodology already discussed at previous Harmonization Conferences. It is applied to several measures: the arc-wise maximum concentration, the cross-wind lateral spreading, the cross-wind integrated concentration and also plume geometric characteristics for Kit Fox Field dataset. The results highlight a good level of performances with values in the range of good performance criteria. Moreover, the influence of the Schmidt number value correlated to the layer stratification on the results has also been investigated.