MATHEMATICAL MODELING OF HEAVY GAS ATMOSPHERIC DISPERSION OVER COMPLEX AND OBSTRUCTED TERRAIN

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Abstract: In this article the capabilities of mathematical heavy gas atmospheric dispersion models to describe the dispersion of heavy gases in complex and obstructed terrain are presented. The models have been categorized into three main classes: phenomenological (empirical) models, intermediate (engineering) models and computational fluid dynamic (research) models. Each group of models is discussed separately. The general features of the models are discussed briefly. Examples of the heavy gas atmospheric dispersion models capable to treat the influence of non-flat and obstructed terrain on the heavy gas dispersion result from the work carried out in the European Union and in the US. No model simulating the heavy gas atmospheric dispersion over complex or obstructed terrain has been yet developed in Poland. The need for future work on the effects of complex and obstructed terrain on the heavy gas atmospheric dispersion is expressed. Future research in the area should include both experimental and modeling work. In the context of this paper future modeling work is worth considering in more detail. It seems that all the approaches to describe the heavy gas atmospheric dispersion over complex and obstructed terrain are worth further attention. This opinion is supported by the fact that these approaches are used in different types of heavy gas dispersion models, which in turn differ in applications. The simpler methods are introduced to the simpler heavy gas atmospheric dispersion models applied mainly in the routine calculations. The advanced techniques capable to describe the flow near complicated geometries are used in the sophisticated models applied mainly as a research tools.