EXPERIMENT AND MODELLING

A. Robins[1], **R. Britter**[2]
[1]*University of Surrey, School of Engineering, Guildford, UK*
[2]*University of Cambridge, University Engineering Department, Cambridge, UK*

Emergency response planners and managers have a number of key requirements for information describing the dispersion of potentially harmful substances released in an urban area. These include the provision of: i) typical exposure patterns that can be used for planning purposes, ii) realistic exposure patterns that can be used for training purposes, iii) detailed post-event analysis, and iv) estimates of source location and strength from interpretation of observations made during an event. All but the first deal with single events and this implies accounting for the random nature of dispersion in the atmosphere; i.e. handling single realisations of an event, rather than the ensemble average of a large number of such realisations, as might be suitable for (i). A variety of modelling strategies has been adopted in response to these needs and experimental work, at full scale and in wind tunnels, has been undertaken to inform their development. Recent relevant experimental studies are summarised and used to illustrate important features of dispersion behaviour and thereby highlight the computational difficulties implied. Wind tunnel experiments, undertaken as part of the DAPPLE project based on an area of central London, are then analysed. This reveals the complexities of dispersion behaviour in such areas and leads to a discussion of the differences between single events and ensemble averages. The range of computational strategies is summarised, emphasising the strengths and weaknesses of each class of approach. Simple methods are then discussed in more detail. An important advantage of such methods is that they have short run times, use limited input information and do not require large infrastructure support, which makes them inherently robust in use. However, simplicity comes at a price that is implicit in the typical models and assumptions employed. These are described and the performance, applicability and limitations of such methods examined. Finally, some research needs are presented that will lead to improved understanding and modelling capabilities.