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Experimentally Benchmarked Numerical Approaches to Lightning Hazard Assessment and Mitigation

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A natural hazard that has been with us since the beginning of time is the lighting strike. Not only does it represent a direct hazard to humans but also to the facilities that they work within and the products they produce. The latter categories are of particular concern when they are related to potentially hazardous processes and products. For this reason experimental and numerical modelling techniques are developed to understand the nature of the hazards, to develop appropriate protective approaches which can be put in place and finally to gain assurance that the overall risks fall within national, international accepted standards and those appropriate to the special nature of the work. The latter is of particular importance when the processes and the products within such facilities have a potential susceptibility to lightning strike and where failure is deemed unacceptable. This paper covers examples of the modelling approaches applied to such facilities within which high consequence operations take place, together with the protection that is required for high consequence products. In addition examples are given of how the numerical techniques are benchmarked by supporting experimental programmes.

Not only should such a safety rationale be laid down and agreed early for these facilities and products but that it is maintained during the inevitable changes that will occur during the design, development, production and maintenance phases. For example an ‘improvement’, as seen by a civil engineer or a facility manager, may well turn out to be detrimental to lightning safety. Constant vigilance is key to ensuring the maintenance of safety.