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Parallelization and application of an Eulerian and Lagrangian models at the Paks Nuclear Power Plant.

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From the environmental point of view, the simulation of the transport of the passive tracer in the atmosphere from a strong point source provides researchers a big challenge. The simulations must have a high degree of accuracy and must be achieved faster than real time to use it for decision making strategy. For this purpose two different and competitive models have been recently developed: a multi-layered Eulerian and Largangian stochastic particle models have been applied to describe transport and deposition of radionuclides or chemically toxic substances. Both mathematical transport models have been coupled to the ALADIN meso-scale limited area numerical weather prediction model used by the Hungarian Meteorological Service. There are several well defined methods and techniques to accelerate the application. One useful solution is the parallelization of source code and the application of the supercomputers, videocards, clusters, and Grid systems to solve these tasks. Therefore, computational Grid systems and videocard simulations are becoming more and more popular in natural sciences. In Grid systems, large number of heterogeneous computer resources is interconnected to solve complex problems. On the other hand, there are several numerical models, in which adaptive girding technique is implemented. The numerical algorithm automatically places a finer resolution grid in regions characterised by high spatial numerical errors, therefore the fine resolution grid follows the plume of the air pollutants. A statistical description of the effect of a hypothetical nuclear accident at Paks NPP has also been carried out, using a macrosynoptic categorizations.