

The Open Accelerator (OpenACC) application programming interface is a relatively new parallel computing standard. In this paper, particle-based flow field simulations are examined as a case study of OpenACC parallel computation. The parallel conversion process of the OpenACC standard is explained, and further, the performance of the flow field parallel model is analysed using different directive configurations and grid schemes. With careful implementation and optimisation of the data transportation in the parallel algorithm, a speedup factor of 18.26× is possible. In contrast, a speedup factor of just 11.77× was achieved with the conventional Open Multi-Processing (OpenMP) parallel mode on a 20-kernel computer. These results demonstrate that optimised feature settings greatly influence the degree of speedup, and models involving larger numbers of calculations exhibit greater efficiency and higher speedup factors. In addition, the OpenACC parallel mode is found to have good portability, making it easy to implement parallel computation from the original serial model.