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## HPC as an Enabler for Growth in Computational Fluid Dynamics Research

*Tuesday, 1 December 2020 11:30 (30 minutes)*

This talk focuses on the computational fluid dynamics (CFD) research conducted in the Department of Mechanical Engineering Science at the University of Johannesburg. The primary purpose of the talk is to highlight the need for and the benefit of high performance computing (HPC) to enable and grow critical and relevant research in this broad area. The use of CFD and HPC has grown significantly over the years within the Department largely due to the acquisition and provision of HPC platforms. CFD research conducted in the Department has ranged from applications in process engineering, separation processes, solar air heating and atomic layer deposition amongst others. Many of these problems require “multi-physics” modelling approaches coupled with exceptionally fine meshes (sub  $mm$ ) and small time step sizes (on the scale of  $\mu s$ ). As a consequence significant HPC resources are required to execute meaningful simulations in these research areas. A spectrum of computational codes are used that range in methodologies such as Navier-Stokes based CFD and the Lattice Boltzmann Method (LBM). Furthermore a mix of proprietary (commercial) and open source codes are leveraged. This talk will focus on the use of internal (institutional) and external (CHPC) HPC platforms for the execution and growth of research in these areas. The typical HPC setup and work-flow employed, codes used as well as a detailed analysis of the compute resources required for such problems will be detailed in this talk. Much of this research has industrial or societal relevance. Thus, an overview of the key results and the impact thereof will be presented.

### **Student?**

No

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