

**CFD + Exp = ❤️**

*Combining numerical and  
experimental results*

*Demetri Bouris, Nikos Pallas, Kostas Kellaris*

TWEET-IE / Twin Wind tunnels for Energy and the  
Environment - Innovations and Excellence

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## INTEGRATION OF PIV DATA INTO THE SIMPLE ALGORITHM FOR 2D TIME-AVERAGED TURBULENT FLOWS



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Article

### Calculation of the Pressure Field for Turbulent Flow around a Surface-Mounted Cube Using the SIMPLE Algorithm and PIV Data

Nikolaos-Petros Pallas \* and Demetri Bouris

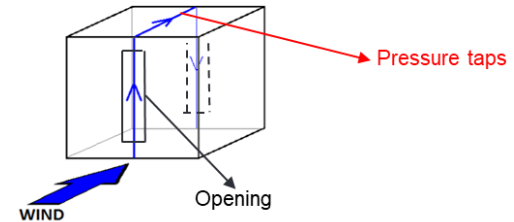
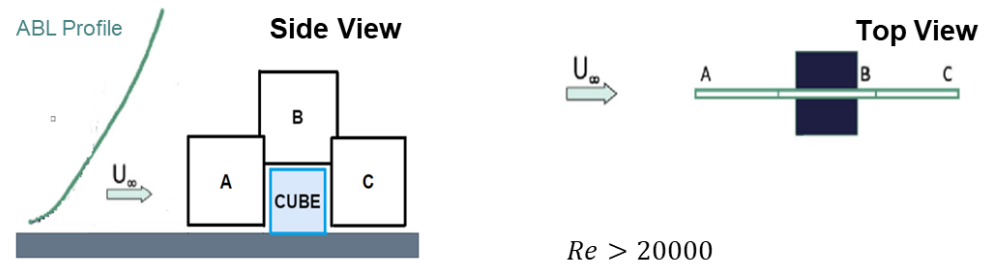


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Laboratory for Innovative Environmental Technologies

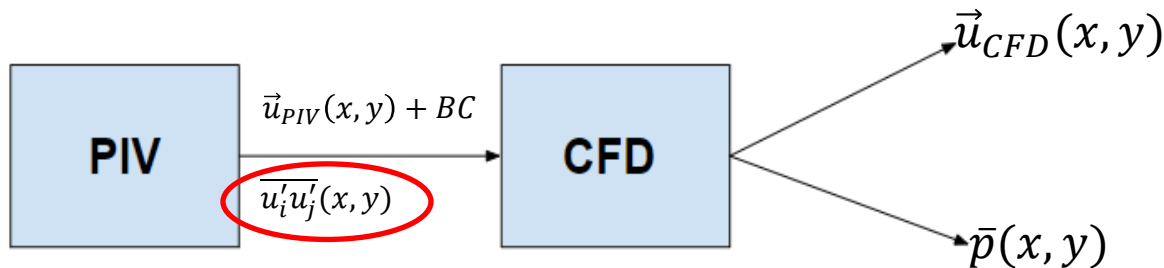
### Application of Data Assimilation Methods in Computational Fluid Dynamics

Diploma Thesis

Konstantinos Kellaris

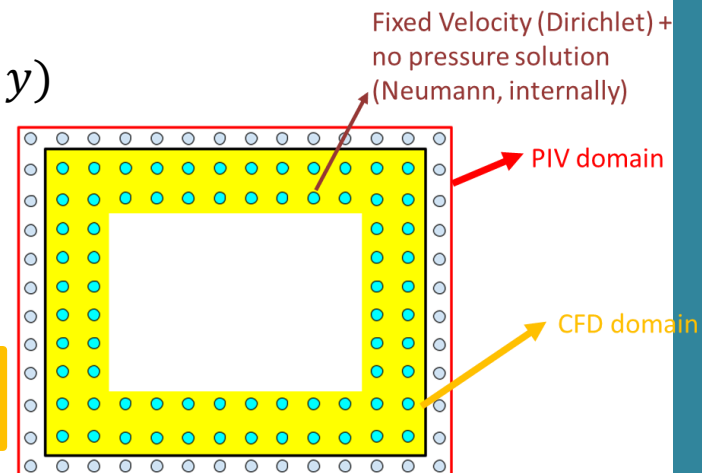


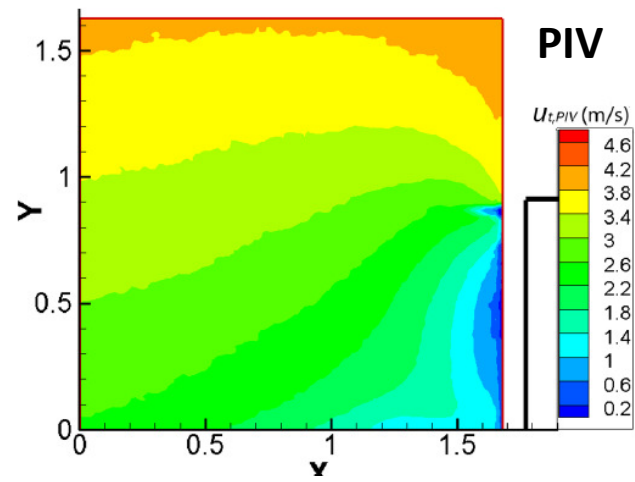
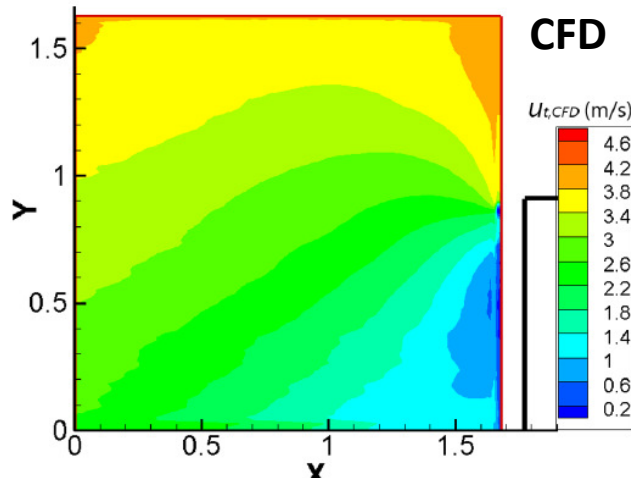
## PIV measurements



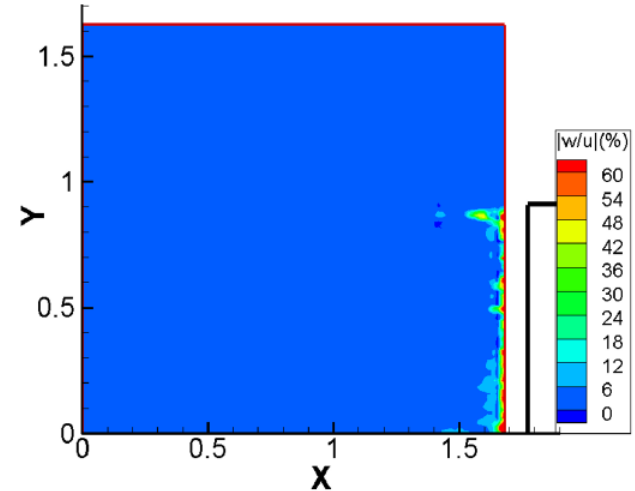
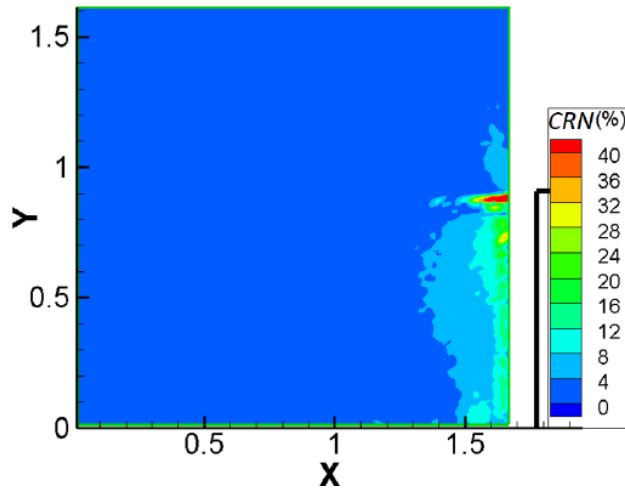
*No turbulence model*  
*Reynolds Stresses from exp data*

## CFD Domain

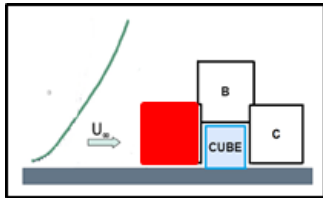


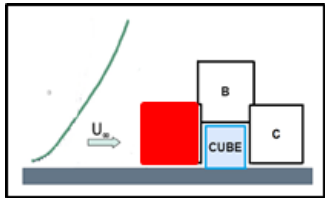
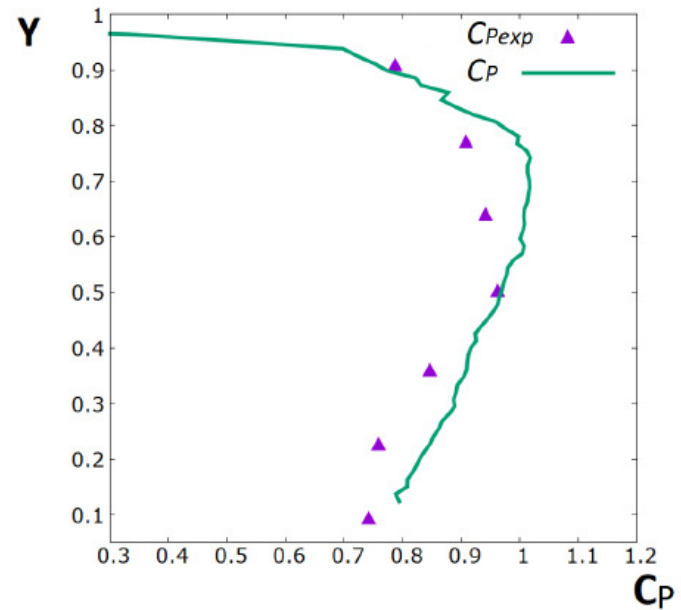
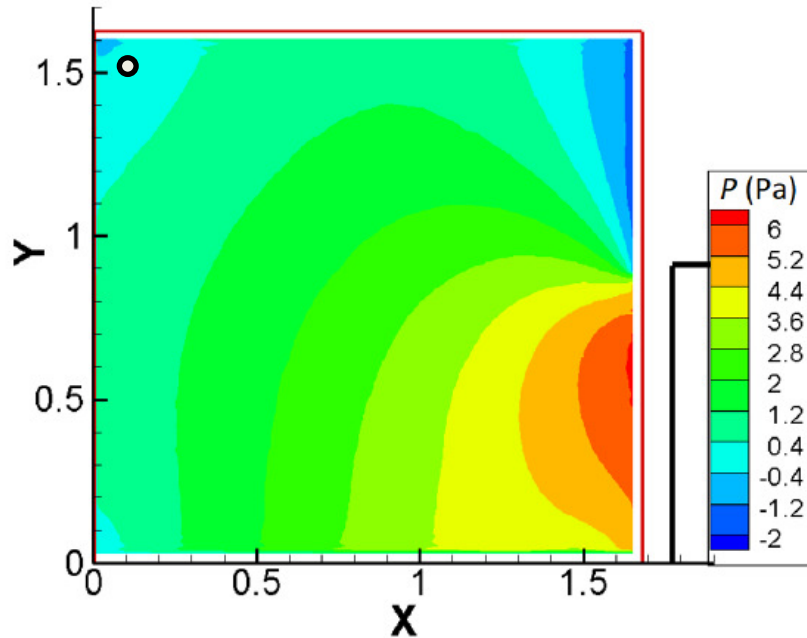


Velocity

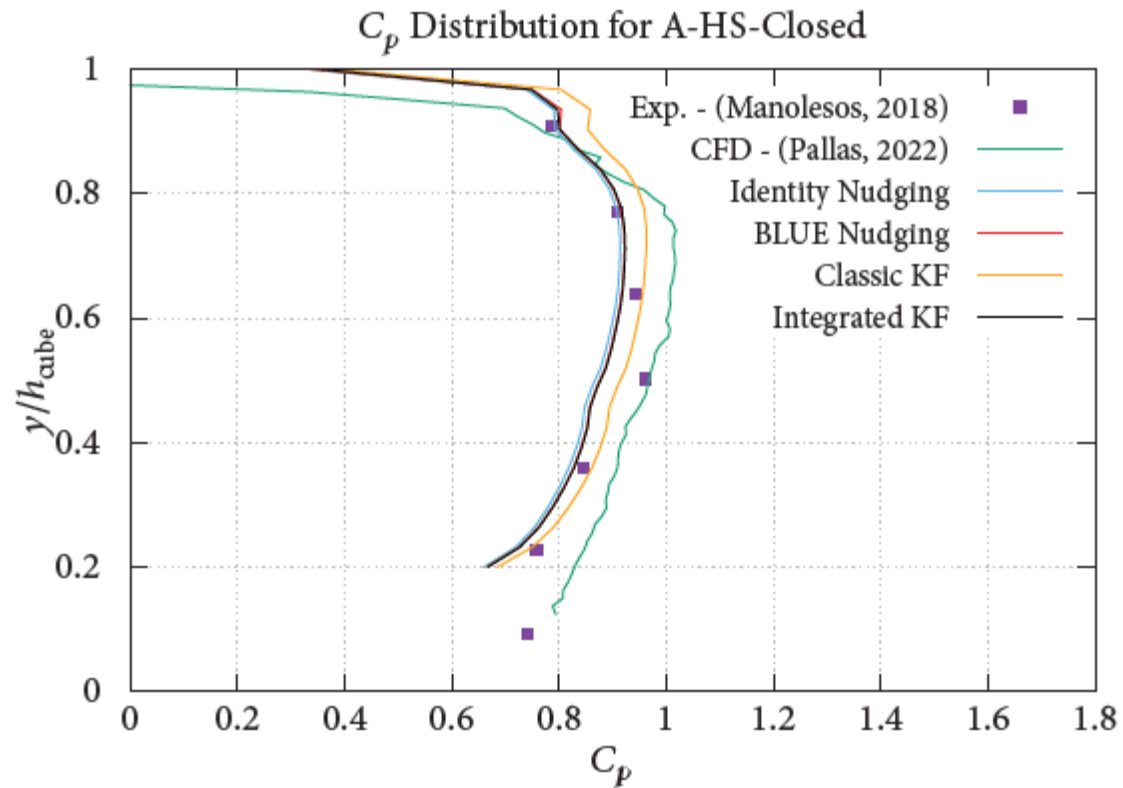


Residuals  
- Errors





**Reference :** Manolesos, M., Gao, Z., Xing, Z., Panos, M. & Bouris, D. 2017 Experimental study of the flow past a cube with openings embedded in a turbulent boundary layer., 10th International Symposium on Turbulence and Shear Flow Phenomena



Open Foam implementation

Still working on :

- Ensemble Kalman Filters (full time PhD)
  - Uncertainty minimisation
  - Assimilation across scales (Re)
- Nudging (implementations in various applications)

Thank you !