



meshlesS Pressure from Image velocimetrY



M. A. Mendez  
von Karman Institute



P. Sperotto  
former Politecnico di Torino,  
von Karman Institute, and  
currently at Dantec Dynamics




M. Ratz,  
former TU Ilmenau,  
currently at von Karman Institute



Sandra Pieraccini  
Politecnico di Torino



# A meshless method to compute pressure fields from image velocimetry

Pietro Sperotto<sup>1,2</sup>, Sandra Pieraccini<sup>2</sup> and Miguel A Mendez<sup>3,1</sup> 

Published 9 June 2022 • © 2022 IOP Publishing Ltd

[Measurement Science and Technology](#), Volume 33, Number 9

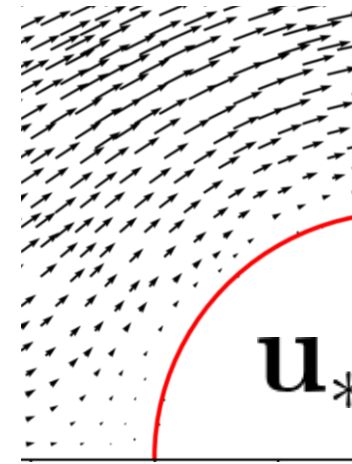
[Machine Learning and Data Assimilation techniques for fluid flow measurements](#)

Citation Pietro Sperotto *et al* 2022 *Meas. Sci. Technol.* 33 094005

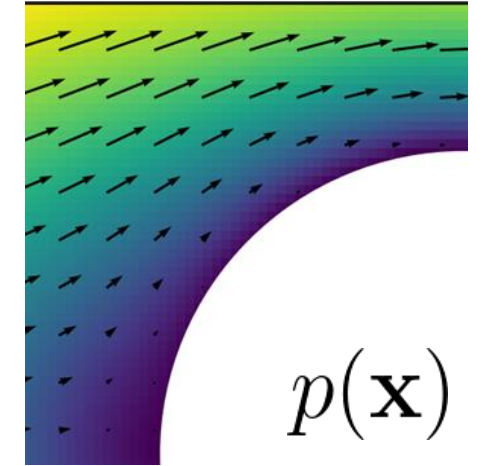
DOI 10.1088/1361-6501/ac70a9



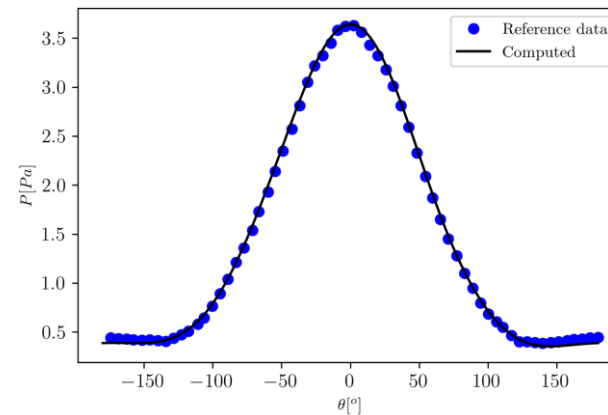
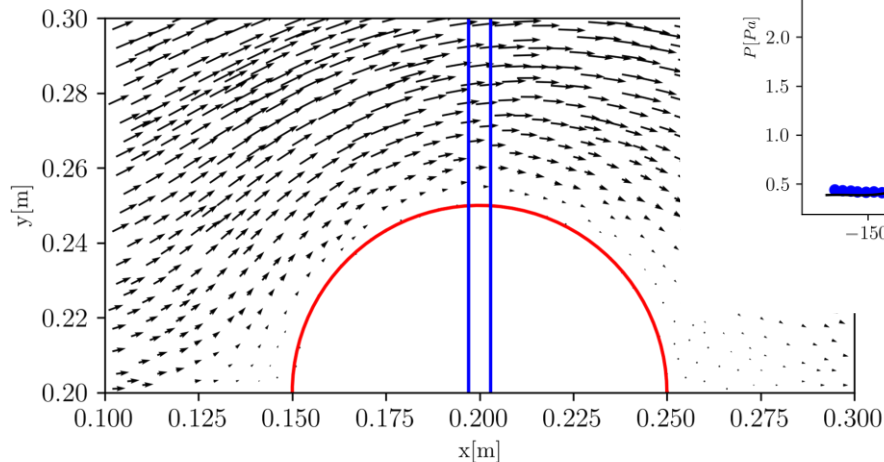
Scattered velocity data



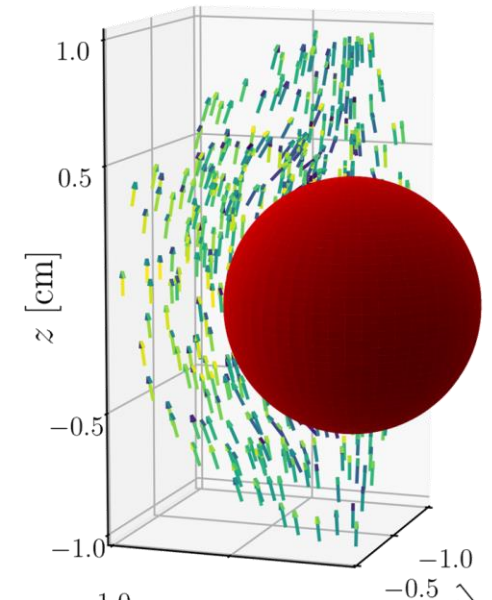
Analytical pressure field



Pressure around the cylinder



Pressure reconstruction from scattered velocity data on a 2D cylinder flow (left) and a 3D Stokes flow (right)



# Table of Contents



1. Theory of constrained RBF Regression and Meshless PDE Integration
2. An Overview of the SPICY class
3. Tutorial 1: the Laplace equation in 2D
4. Tutorial 2: Constrained regression of a vector field in 2D
5. Tutorial 3: from velocity regression to pressure computation
6. Tutorial 4: a 3D case of data assimilation- the Stokes flow
7. Ongoing works and perspectives (by Manuel Ratz)