# Plan Overview

*A Data Management Plan created using DMPonline*

**Title:** PhD Project

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**Affiliation:** University of Manchester

**Template:** University of Manchester Generic Template

**Project abstract:**

The forthcoming generation of nuclear reactors, proposed Small Modular Reactor (SMR) designs make increased claims on passive safety features such as reliance upon natural circulation within the primary circuit as either an alternate, backup or main cooling approach following reactor trip or a fault occurring. The PhD project overviews the challenges concerned with the numerical modelling of the circuit behavior related to an SMR. A better understanding of the fluid flow and heat transfer characteristics is provided through the investigation of simplified systems, closed loops, in single phase and conditions that will be representative enough to draw a direct analogy with the reactors circuit and assess currently used one dimensional approaches. For the purpose, the Finite Volume method is adopted in order to characterize the flow field using the most widely verified turbulence models to close the Reynolds-averaged Navier-Stokes (RANS) equations. Implementing these models appropriately can enable the accurate prediction of the turbulence and the heat fluxes statistics of the flow field. The tool for the solution process is the opensource software Code_Saturne, a generic-purpose Computational Fluid Dynamics (CFD) code developed by EDF R&D. Academic canonical cases that DNS validation data is available such as an unsteady natural convection flow in a heated square cavity at sufficiently high Rayleigh number, (1e11), are initially investigated both using two dimensional and three dimensional grids. In this case, some of the turbulence models are challenged in maintaining the flow fully turbulent whereas others exhibit their performance in computing near wall heat fluxes with the log-law or a more advanced wall function treatment implemented. From the findings, the most suitable RANS models are identified to be used for simulating the more complex but geometrically simple natural circulation 3D loops on a range of Rayleigh numbers (1e9-1e11). This will assist in a more accurate 3D representation of the temperature and velocity distribution, giving a better insight in the design of any future experiments.

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**Copyright information:**

imply that the creator(s) endorse, or have any relationship to, your project or proposal

# PhD Project

## Manchester Data Management Outline

**1. Will this project be reviewed by any of the following bodies (please select all that apply)?**

- None of the above

**2. Is The University of Manchester collaborating with other institutions on this project?**

- No - only institution involved

**3. What data will you use in this project (please select all that apply)?**

- Generate textual supporting information only

**4. Where will the data be stored and backed-up during the project lifetime?**

- P Drive (postgraduate researchers and students only)

**5. If you will be using Research Data Storage, how much storage will you require?**

- 1 - 8 TB

**6. Are you going to be working with a 3rd party data provider?**

- No

**7. How long do you intend to keep your data for after the end of your project (in years)?**

- 0-4 years

***Questions about personal information***

**Personal information, also known as personal data, relates to identifiable living individuals. Special category personal data is more sensitive information such as medical records, ethnic background, religious beliefs, political opinions, sexual orientation and criminal convictions or offences information. If you are not using personal data then you can skip the rest of this section.**

**Please note that in line with data protection law (the General Data Protection Regulation and Data Protection Act 2018), personal information should only be stored in an identifiable form for as long as is necessary for the project; it should be pseudonymised (partially de-identified) and/or anonymised (completely de—identified) as soon as practically possible. You must obtain the appropriate ethical approval in order to use identifiable personal data.**

**8. What type of personal information will you be processing (please select all that apply)?**

- No sensitive or personal data

**9. Please briefly outline how you plan to store, protect and ensure confidentiality of the participants' information.**

N/A

**10. If you are storing personal information (including contact details) will you need to keep it beyond the end of the project?**

- Not applicable

**11. Will the participants' information (personal and/or sensitive) be shared with or accessed by anyone outside of the University of Manchester?**

- Not applicable

**12. If you will be sharing personal information outside of the University of Manchester will the individual or organisation you are sharing with be outside the EEA?**

- Not applicable

**13. Are you planning to use the personal information for future purposes such as research?**

- No

**14. Who will act as the data custodian for this study, and so be responsible for the information involved?**

Prof Hector Iacovides

**15. Please provide the date on which this plan was last reviewed (dd/mm/yyyy).**

2020-02-17

## Project details

**What is the purpose of your research project?**

The aim of the project is to investigate natural convection systems, academic canonical cases, which can assist in the safety and design of forthcoming power plants.

**What policies and guidelines on data management, data sharing, and data security are relevant to your research project?**

This is fundamental data which is not subject of any confitentiality and it has only scientific importance

## Responsibilities and Resources

**Who will be responsible for data management?**

PI will be responsible

**What resources will you require to deliver your plan?**

Access to the HPC and Research Data Storage

## Data Collection

**What data will you collect or create?**

Numerical simulation results

**How will the data be collected or created?**

Generated from computer simulation

## Documentation and Metadata

**What documentation and metadata will accompany the data?**

PhD thesis and scientific publication will be the final outcome

## Ethics and Legal Compliance

**How will you manage any ethical issues?**

Not applicable

**How will you manage copyright and Intellectual Property Rights (IPR) issues?**

Not applicable

## Storage and backup

**How will the data be stored and backed up?**

Data will be stored both on local machine and central University Storage

**How will you manage access and security?**

Data is not confidential though access is given to specific users

## Selection and Preservation

**Which data should be retained, shared, and/or preserved?**

Contains amount of post process data that might be used for later associate projects/investigations

**What is the long-term preservation plan for the dataset?**

The PhD thesis will document the mehtodology of the generated data. We will compact the data that is most significant and the rest will be deleted after the end of the project.

## Data Sharing

**How will you share the data?**

Information from the post process data will be made publically available

**Are any restrictions on data sharing required?**

Not applicable