Heat Transfer – 2022/2023

Project (Continuous Assessment)

INSTRUCTIONS

1. Report Submission

- The deadline to submit the project report is the end of the 5th week, on October 28th, 23h59 (Lisbon time).

- The written report must be submitted as a single (separated) pdf file. Use Times New Roman lettering with size of 12.

- A zip file (compressed folder) containing all other files (for example, TEACH-C source files, outputs, etc.) used to obtain the results presented in the report must also be submitted.

- Submitted files – pdf (report) and zip (other files) – must have the following filename structure:

  GGroupNumber-SSolidName.pdf (report);

  and

  GGroupNumber- SSolidName.zip (other files),

  where "GroupNumber" and "SolidName " must be replaced by your group number and solid name from the project statement, respectively. For example, if "20" corresponds to your group number and "A" to your solid designation, the files submitted must be named as "G20-SA.pdf" (report) and "G20-SA.zip" (zipped file). Submitted files with filename structures other than the recommended one will not be considered for assessment.

- The Project files (report and zip) must be submitted through the following Submission Form using an IST account:

  ## https://forms.gle/erUhPgyCGL6gS1818

- The Submission Form cannot be edited after submission.

- Only one group member submits the form. If more than one group member submits a file, the last submitted file will be considered while the previous one(s) will be automatically deleted.

2. Report Structure – Detailed Organization

The Project report structure should comply with the following organization (within each listed section relevant items to take into consideration are *suggested*):

Cover page (Maximum Recommended Length: 1 page): Title of the work, authors (IST numbers and names), name of the discipline, date.

Abstract (Maximum Recommended Length: 300 words) – brief overview and global description of the work, including results and conclusions.

Author Contributions (Maximum Recommended Length: 1 paragraph – in the same page as Abstract)
- who did what

1. Introduction (Maximum Recommended Length: 1 page)
- project topic presentation and relevance;
- project objectives; and
- document structure.

2. Description of problem under study (Maximum Recommended Length: 7 pages)
- phenomena to be analysed and used tools
- geometry – geometric parameters (use figures if necessary);
- material properties – thermophysical properties; and
- brief description (referenced) of: analytical solutions used; mathematical model with governing equations, boundary conditions, initial condition that describe the problem as predicted by the TEACH-C code.
- brief description of: the numerical model; considered computational domain; and computational domain discretization – meshes considered to solve the problem.

3. Results and Discussion (Maximum Recommended Length: 10 pages)
It must contain at least:
- relevant plots for the discussion of the analytical work and the numerical work.
- grid independence study – numerical solution accuracy;
- any other complementary relevant information for the results discussion
- critical discussion of all the results, by assessing them independently and comparatively.

4. Conclusions (Maximum Recommended Length: 1 page)

References (Maximum Recommended Length: 1 page)

- Number your references in the text by order of appearance.
  Examples:
  "Computational fluid dynamics (CFD), which has been widely used as a supporting tool in built-environment design for more than fifty years [1], has also proved to be powerful in predicting moist air flows inside built environments for complex conditions, such as non-isothermal, turbulent and three-dimensional flows allied to the space occupancy by persons and/or furniture [2–5].";

"Using a different approach, **Yen and Liu [32]** presented a new extension of the SIMPLE algorithm that introduces an explicit corrector step to the first corrected velocities, in turn obtained through the existing algorithms (SIMPLE, SIMPLEC or PISO)."

- Use the following <u>examples</u> as guidelines for your references list at the end of the report:

  Papers from scientific journals [authors, paper title, *Journal name* vol. (year) pp1-pp2].

  [1] P.V. Nielsen, Fifty years of CFD for room air distribution, *Building and Environment* 91 (2015) 78–90.

  [2] N. Serra, V. Semiao, Characterization of non-isothermal flows typical of built environments in a laboratory scale model. Part I – experiments with 3DPIV, *Building and Environment* 68 (2013) 225–238.

  Book (or book chapter) [authors, <u>Book Title</u>, (chapter name/number) editor, city, year]*:*

  [3] S. Patankar, <u>Numerical Heat Transfer and Fluid Flow</u>, (chapter 3) Hemisphere, New York, 1981.

  <u>*Internal Report from Institution (Department if available)*</u>: [authors, <u>Report Title</u>, Report reference, Department, Institution, city, year]:

  [4] D. Spalding, <u>Mathematical Modelling of Fluid Mechanics, Heat Transfer and Mass Transfer Processes</u>, Rep. HTS/80/1, Mech. Eng. Dept., Imperial College of Science, Technology and Medicine, London, 1980.

  <u>*Thesis (MSc or PhD)*</u> [author, <u>Thesis Title</u>, Type of thesis, Department, Institution, city, country, year]:

  [5] J.A.M. Rodrigues, <u>Hybrid Solar Thermal Power Plants</u>, Msc. thesis, Dept. Mech. Eng., Instituto Superior Tecnico, Lisbon, Portugal, 2019.

  <u>*Internet page*</u>:
  <u>https://tecnico.ulisboa.pt/pt/</u> (accessed on 10th October 2021)

<u>Appendix</u> (Optional Section – Maximum Recommended Length: 6 pages)
- Complementary details to the main document body.

<u>Annexes</u>
<u>Annex 1</u>: Teach-C Source Code adapted to solve the problem under consideration. All modified or introduced code segments must be highlighted.
<u>Annex 2</u>: Teach-C output results for the particular mesh considered in the document. (The source code provided in Annex 1 when executed should provide the output results presented in this annex).

3. Report Structure – General Guidelines

- The main body of the report is composed by the Cover Page, the Abstract and Author Contributions (in the same page), Sections 1 – 4 and References.
- The report main body should not exceed 22 pages.
- Among all recommended sections, only the Appendix Section is optional.
- Any content complementing the main body document should be placed at the Appendix Section – deductions; complementary figures, tables, etc.
- If the Appendix Section is included, it should be introduced (referred) in the main body of the report next to the proper content.
- The reader should find along the main body of the document a reference to the annexes.
- Although the Abstract, Author Contributions, References, Appendix, and Annex constitute independent sections, these sections should not be numbered.
- The authors are free to include items in the report other than those suggested along the report structure.
- Organization of each section content in subsections (levels) are allowed – this may be particular useful for the organization of Sections 2 and 3. (However, keep in mind that more than two levels of organization are not recommended.)
- All figures and tables should be numbered and should be referred in the text – do not include figures/tables without the corresponding reference in the text.
- Tables and figures should have a caption with a succinct description, so that the reading of it allows for the understanding of its content. Captions should be placed below figures and above tables.

4. Report Evaluation – Criteria

- The report maximum (minimum) grade is 20 (0) points.
- The report evaluation is based on the following criteria (with the stated weight):

Technical Content - 70% (14 Points)
➢ topic mastery and technical correctness;
➢ capacity of synthesis;
➢ all requested deliverables included;
➢ appropriate level of detail and thoroughness of documentation; and
➢ completeness of analysis and interpretation of data.

Organization - 10% (2 Points)
➢ content clearly and logically organized;
➢ good transition between topics; and
➢ clearly identified purpose and approach.

Document Presentation - 10% (2 Points)
➢ easy to read;
➢ grammar and writing style; and
➢ uniform and coherent citation and referencing style.

Layout/Visuals - 10% (2 Points)
➢ uniform document design and layout; and
➢ quality of graphics.