

INSTALLATION MANUAL



**TÉCNICO
LISBOA**

DECIVIL
DEPARTAMENTO DE ENGENHARIA
CIVIL, ARQUITECTURA E GEORRECURSOS

DISCLAIMER

FreeHyTE – Transient Heat

Hybrid-Trefftz Temperature Finite Elements for Transient Heat Conduction

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ACKNOWLEDGEMENTS

FreeHyTE – Transient Heat

Hybrid-Trefftz Temperature Finite Elements for Transient Heat Conduction

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1. OVERVIEW

FreeHyTE is a collection of finite element solvers for elliptic, parabolic and hyperbolic initial boundary value problems using hybrid and hybrid-Trefftz finite elements.

The **FreeHyTE** computational platform is developed at the CERIS Research Centre, Instituto Superior Técnico, University of Lisbon. The development structure relies heavily on the constant engagement of Senior Year Master of Science students to perform the bulk of the coding duties for the various modules of **FreeHyTE**. Consequently, each module of the platform is developed and deployed separately, although they all share the same workflow, data structures, computational procedures and I/O sequences.

Each module of **FreeHyTE** is released under the GNU Public Licence and is a free software. The deployment is conducted in two phases:

- Phase Beta
Phase Beta corresponds to the deployment of Beta versions of the module. Potential users are encouraged to download, install, use and provide feedback on the software. Your user experience is the driving force for improving it to the point where we are reasonably sure that most major bugs have been eliminated.
- Phase Gamma
Phase Gamma corresponds to the deployment of more matured versions of the module. External developers are encouraged to work with us for further developing the code.

In Phase Beta, the deployment of the modules is limited to two vectors, namely via Matlab Apps and through direct use of the code files. In Phase Gamma, standalone versions of the modules will be added for users without access to Matlab. Deployment via web pages is also considered.

This manual describes the installation of **FreeHyTE – Transient Heat** module as a Matlab App and its deployment for direct use of the code files.



Please note that the module was tested in Matlab version 2016a.
Kindly let us know if you experience difficulties in using it under other versions of Matlab.

2. CONTENTS OF THE PACKAGE

FreeHyTE – Transient Heat deployment package includes the following files:

File	Description
FreeHyTE - Transient Heat (2016).mlappinstall	Matlab App installer tested on R2016a
FreeHyTE - Transient Heat.zip	ZIP archive containing the source (*.m) files, to be used in alternative to the Apps or if the app installation fails on some Matlab version
SUPPORTING_DOC_Coutinho_2017_In_Portuguese.pdf	Theoretical description of the hybrid-Trefftz finite elements for transient heat conduction and implementation notes, including topology, data structures and workflow (in Portuguese)
InstallationManual_TransientHeat.pdf	Installation manual (in English)
UsersManual_TransientHeat.pdf	User's manual (in English)

The *.mlappinstall files are Matlab App installers. They provide a simple way to use the module without worrying about the code files. Conversely, the FreeHyTE - Transient Heat.zip file includes all code files and can be ran and expanded according to your interest.



Matlab Apps were introduced in R2012b. Users running earlier Matlab versions should use the *.zip file instead.

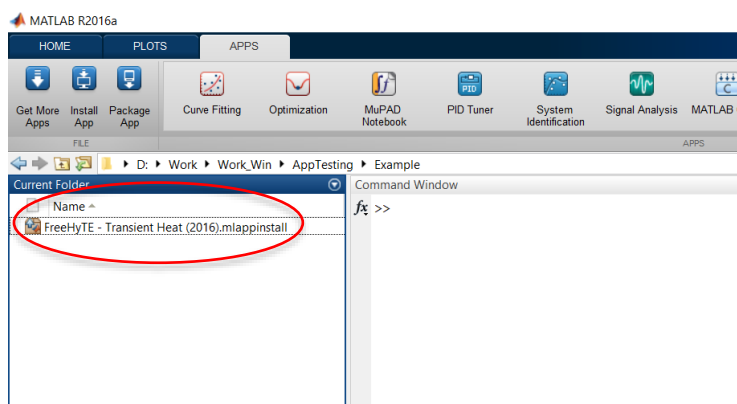
3. INSTALLING A MATLAB APP

Matlab Apps are simple and convenient ways to quickly get to use Matlab programs if you are not overly enthusiastic about expanding them. They feature a one click installation from a single file and adds a shortcut in the APPS tab. For more help on Matlab Apps, please follow this [link](#).

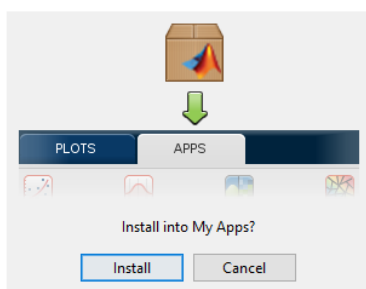
Before you install the App, please make sure that your version of Matlab includes the following packages: *Partial Differential Equation Toolbox*.

To install **FreeHyTE – Transient Heat** as a Matlab App, you will need the installer (*.mlappinstall) file. After downloading the installer, you will need to walk through the following steps:

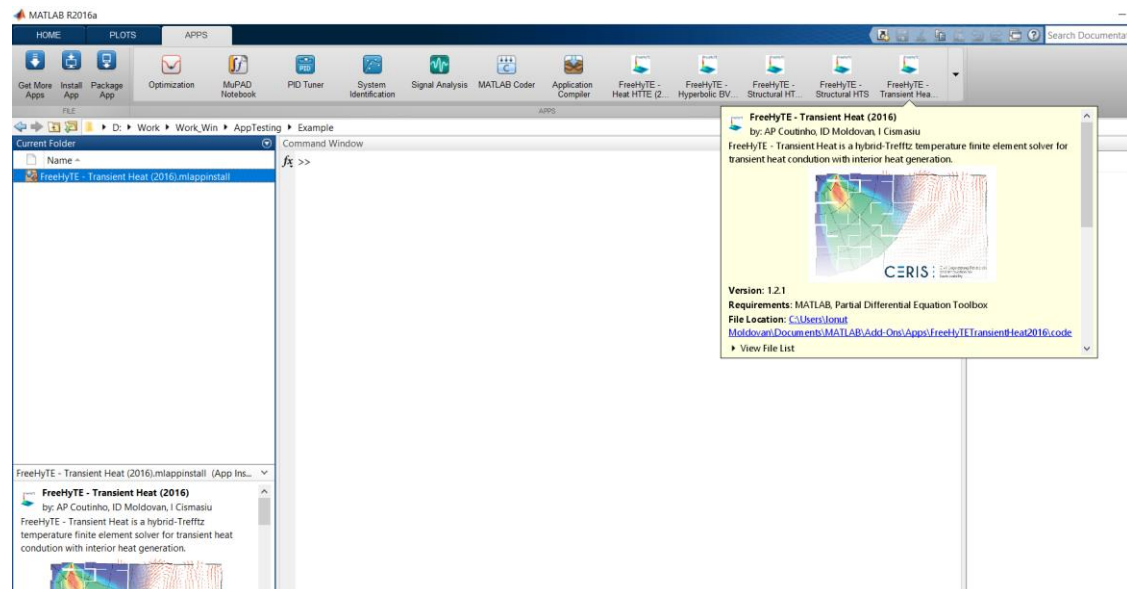
- Save the installer in a local folder;
- Start your Matlab and browse for the directory where you saved the installer;



- Double click the installation file to open the installation dialog. Click the 'Install' button;



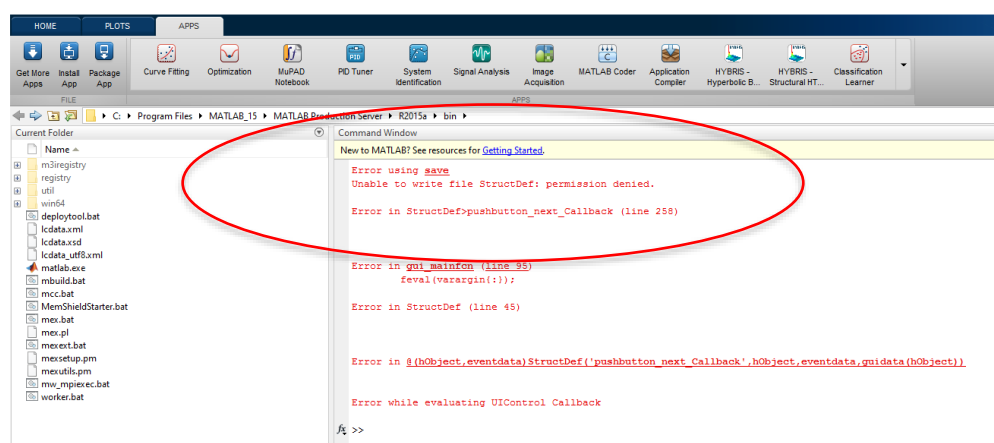
- d. This should install the App into the Apps tab of the Matlab interface. Hoovering over its icon in the Apps tab, you should get additional information about the application, including a list of the *.m files included in the package;



- e. Just clicking the App's icon should launch the module. You're done!



Please note that the module needs disk access. Please run it from a directory where you have writing permission. Failure to do so will yield an error along the lines presented in the following figure:



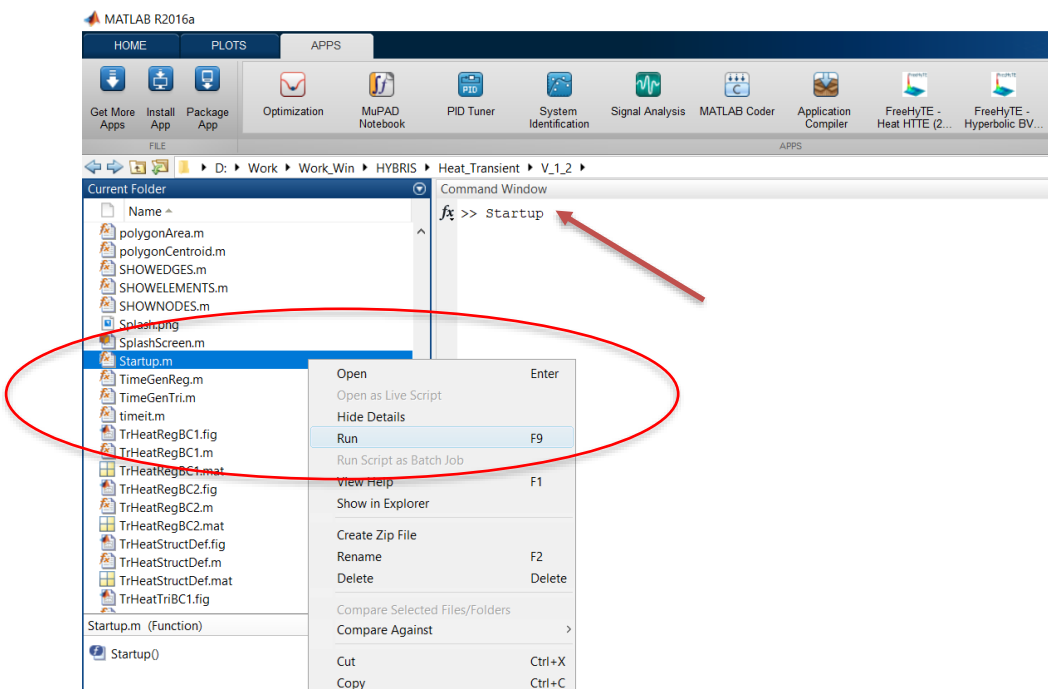
4. RUNNING FROM THE SOURCE FILES

Running **FreeHyTE – Transient Heat** directly from the source files is admittedly less elegant than installing an App, but it offers the trade-off of being much less prone to errors caused by not-so-compatible versions of the App compiler.

This strategy is thus recommended to users experiencing any issues with the **FreeHyTE – Transient Heat** App installed as described in Section 3 and to potential developers of the module.

Archive **FreeHyTE - Transient Heat.zip** contains all files needed to run **FreeHyTE – Transient Heat**. After downloading the archive, you will need to walk through the following steps:

- Unpack the archive in a local directory;
- Start your Matlab and browse for the directory where you unpacked the archive;



- Find file **Startup.m** in the **Current Folder** window, select it and press <F9>; or,
- Run the same file by writing '>> **Startup**' in the **Command Window**. That's it!