PeyeQM Documentation

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CONTENTS

PeyeQM is a Python based Platform for the solution of 2D Finite Element problems.

CHAPTER

ONE

WHAT CAN IT DO?

-It can solve maxwell and schroedinger equations for simple 2D problems using the Finite Element Method. - Supports scalar and vectorial formulations. - Is capable of handling periodic conditions for simulation of crystals. - Is in ongoing development for the solution of transient problems.

CHAPTER

TWO

LICENCE

This project is distributed under the standard MIT Licence, please use this and twist it in whatever fashion you wish - and recommend any cool changes to help the code.

2.1 Documentation for the code

This page stores the documentation for modules of code.

2.1.1 Modules

These are the modules of PeyeQM

Documentation for Module Classes.py

Classes module specifications.

Module Classes holds many of the classes used by PeYeQM to define the instances necessary for the initial statement of a simulation problem.

List of Classes

Simulation() Top level class of a FEA. It contains as attributes all other classes listed below. It has

- Definition of the problem.
- Details about the context of the solution.

Domain() Representation of the physical domain of a simulation. It has:

- Information about regions and their discretization
- definitions of elements, nodes and boundary conditions

Region() A region is an object that allows the identification of different material properties according to a previous subdivision of the Domain.

Nodes() Class Nodes represents the coordinates of the points that result from a discretization of a given domain.

Elements() Class elements is a container for sets of 1D and 2D elements that can be of different shapes and orders. Elements are representations of the relation between nodes of a discretized domain. Current supported elements are:

- Lines
- Triangles
- Quadrilaterals

Lines() An instance of class Lines() is a container of line elements. This class also defines common operations and attributes that involve line elements.

Triangles() An instance of class Triangles() is a container of triangular elements. This class also defines common operations and attributes that involve triangular elements.

Quadrilaterals() An instance of class Quadrilaterals() is a container of QUAD elements. This class also defines common operations and attributes that involve QUAD elements.

Boundaries() This class acts as a container of boundaries and their attributes. Boundaries of a domain are the objects where edge conditions are stated.

DOF() DOF is a class that was defined for transient simulations only. A DOF represents a degree of freedom in a dynamic problem, and has the necessary attributes and methods for a time dependant algorithm

Documentation for Module Interpreter.py

Module interpreter. Will be a place to temorarily hold the class that receives a simulation file and then assembles the linear equations to solve

Documentation for Module Solver.py

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Module Solver shall contain all the solver algorithms needed to extract the solution out of a system of equations produced by the interpreter.

Documentation for Module write.py

This module contains functions to write mesh files (pre-defined file formats).

Documentation for Module read_mesh.py

This module contains functions to read mesh files (pre-defined file formats).

CHAPTER

THREE

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