
Lamprop manual

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1 Introduction

The purpose of this program is to calculate some properties of fiber-reinforced composite laminates. It calculates:

- engineering properties like E_x , E_y and G_{xy}
- thermal properties like α_x and α_y
- physical properties like density and laminate thickness
- stiffness and compliance matrices (ABD and abd)

Although these properties are not very difficult to calculate, (the relevant equations and formulas can be readily found in the available composite literature) the calculation is time-consuming and error-prone when done by hand.

This program can *not* calculate the strength of composite laminates; because there are many different failure modes, strengths of composite laminates cannot readily be calculated from the strengths of the separate materials that form the laminate. These strengths have to be determined from tests.

The original version of this program was written in C, since implementing it in a spreadsheet proved cumbersome, inflexible and even produced incorrect results. The C version ran up to 1.3.x.

As an exercise in learning the language, the author ported the program to the Python programming language. This proved to be a much cleaner, more maintainable and shorter implementation.

In the meantime, the program was ported from python version 2 to python version 3 and the core objects (in the `types.py` file) were made immutable. Also the output method was made generic to enable output in different formats, such as \LaTeX , HTML and RTF.

Additionally, the generally hard to obtain transverse fiber properties were replaced with properties derived from the matrix.

2 Building and installing the program

2.1 Requirements

The main requirements are `python` (version 3.4 or later) and the `numpy` library (version 1.6 or later). Currently the development is done using `python 3.6` and `numpy 1.13`.

For developers: You will need `py.test`¹ to run the provided tests. Code checks are done using `pylama`². Both should be invoked from the root directory of the repository.

There are basically two versions of this program; a console version (installed as `lamprop`) primarily meant for POSIX operating systems and a GUI version (installed as `lamprop-gui`) primarily meant for ms-windows.

You can try both versions without installing them first, with the following invocations in a shell from the root directory of the repository.

Use `python3 -m lamprop.console -h` for the console version, and `python3 -m lamprop.gui` for the GUI version.

2.2 Installation

Run `python3 setup.py install`. This will install both the module and the scripts that use it.

¹<https://docs.pytest.org/>

²<http://pylama.readthedocs.io/en/latest/>

Colofon

This document has been typeset with the $\text{T}_{\text{E}}\text{X}^3$ software, using the $\text{L}_{\text{A}}\text{T}_{\text{E}}\text{X}^4$ macros and specifically the `MEMOIR`⁵ style.

³<http://nl.wikipedia.org/wiki/TeX>

⁴<http://nl.wikipedia.org/wiki/LaTeX>

⁵<http://www.ctan.org/tex-archive/macros/latex/contrib/memoir/>