Verification and Validation Report for Solar Water Heating Systems Incorporating Phase Change Material

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Contents

1 Introduction

This document is a report on the results of a testing suite for a Solar Water Heating System incorporating Phase Change Material simulator.
Detailed descriptions of the tests executed can be found in the Verification and Validation Plan document.

2 System Tests

2.1 Faulty Input

The following tests have failed by verification:

Table 1: Faulty Input Cases

No.	Input	Expected Outcome	Expected MsgID	Actual MsgID
40	$T_{\text{init}} = 45$	error: Tinit must be < 0 Tmelt	input:TinitTmelt	MATLAB:badsubscript

2.2 Closed Form Solution for Latent Heating

The relative error between the closed form solution for water temperature and the simulator solution was 0.0046.

2.3 Alternative Algorithm

When comparing the output of a simulator using the ode23 solver to this simulator (using ode45), there was zero difference in the results in all cases.

2.4 Comparison to Original Implementation

All tests passed with a relative tolerance of 0.002.

3 Unit Tests

3.1 Temperature Modules

All tests passed within a relative tolerance of 1e-06.

3.2 Energy Modules

All tests passed within a relative tolerance of 1e-08.

3.3 Event Modules

All tests passed within a relative tolerance of 1e-08.