UNDERSTANDING CHARGE, MASS AND HEAT TRANSFER IN FUEL CELLS FOR TRANSPORT APPLICATIONS

Grant agreement no.: 875155
***Start date**: 01.01.2020 – **Duration**: 36 months*
***Project Coordinator**: Dr. Patrick Fortin - SINTEF*

DELIVERABLE REPORT

DELIVERABLE NUMBER – NAME OF THE DELIVERABLE		
Due Date	M46	
Author (s)	David Harvey	
Workpackage	WP2 Performance Model Development and Validation	
Workpackage Leader	David Harvey	
Lead Beneficiary	FAST Simulations UG	
Date released by WP leader	20/02/2024	
Date released by Coordinator	20/02/2024	
DISSEMINATION LEVEL		
PU	*Public*	***X***
PP	*Restricted to other programme participants (including the Commission Services)*	
RE	*Restricted to a group specified by the consortium (including the Commission Services)*	
CO	*Confidential, only for members of the consortium (including the Commission Services)*	
NATURE OF THE DELIVERABLE		
R	*Report*	***X***
P	*Prototype*	
D	*Demonstrator*	
O	*Other*	

SUMMARY	
Keywords	*Model, PEMFC, Performance*
Abstract	*A COMSOL-based implementation of FAST-FC has been completed and has been uploaded to an online, public GitHub repository for public access. The repository has issue tracking and version control to ensure that user feedback can be logged and improvements to the COMSOL-based FAST-FC model can be controlled and tracked.*
Public abstract for confidential deliverables	

REVISIONS			
Version	**Date**	**Changed by**	**Comments**
1	February 18, 2024	David Harvey	Draft
1	February 18, 2024	David Harvey	Release

SOURCE CODE PREPARED FOR PUBLIC RELEASE AND DISSEMINATION

CONTENT

1 Executive Summary

The COMSOL-Based FAST-FC has been improved as part of the project to include updated transport models for dissolved water within the ionomeric phase and liquid water within the pore space of the porous media. The model has also been fully rebuilt and the structure of the model modified to make it easier for users to directly interact with. This updated and improved COMSOL-based version has been uploaded into a GitHub public repository and released to the public; the repository as includes issue tracking in order to allow users to raise issues and requested changes for bugs and issue management topics.

2 Introduction

WP2 has been focussed on updating and improving the FAST-FC model within this project and completing validation using SoA MEAs. Following the completion of these activities, the COMSOL-based version of FAST-FC is intended to be released for public dissemination through the hosting of the model file within FAST Simulations GitHub repository.

3 Scope

This document covers the overview of the public dissemination of the COMSOL-based version of FAST-FC and described how to access the model and open issue tracking for bugs which may arise during use.

4 Discussion

The COMSOL-based version of FAST-FC has been upgraded and improved as part of WP2. FAST-FC is a performance model written within COMSOL and includes electron transport, proton transport, species transport, dissolved water transport, liquid water transport, and heat conduction. The model has been applied and validated in the study of State of the Art ("SoA") Membrane Electrode Assemblies. The conclusion of the work package is the upload of the final model version into a GitHub repository and the opening of access to the public and overall fuel cell community.

4.1 GitHub Repository

4.1.1 COMSOL-Based FAST-FC Repository

The model has been uploaded to an online repository located at https://github.com/fastSimulations/EU-CAMELOT.

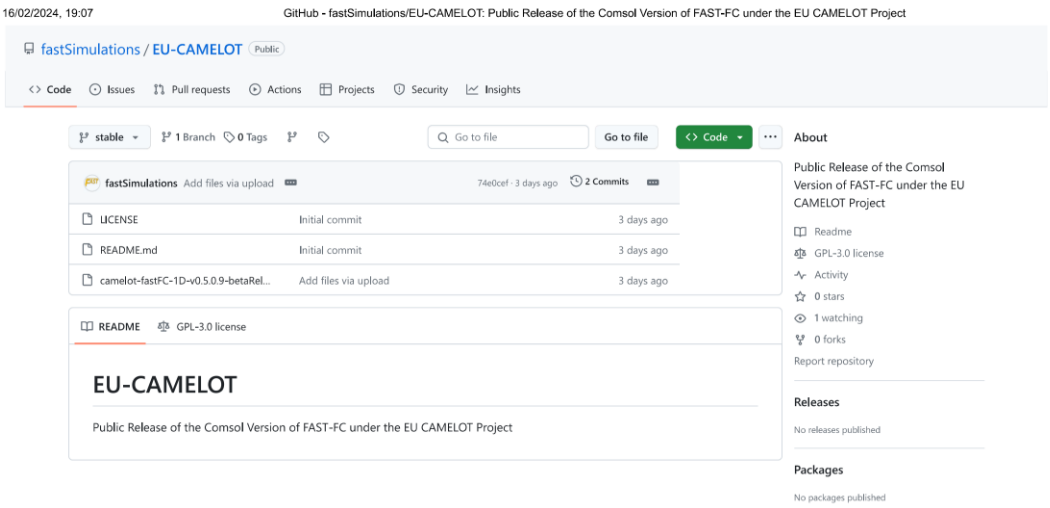

Figure 1: Screenshot of the uploaded COMSOL-based FAST-FC Model into the GitHub Repository.

4.1.2 Issue Tracking

The issue tracking system has been opened alongside the main repository shown in Figure 1; the issue tracking is located at https://github.com/fastSimulations/EU-CAMELOT/issues.

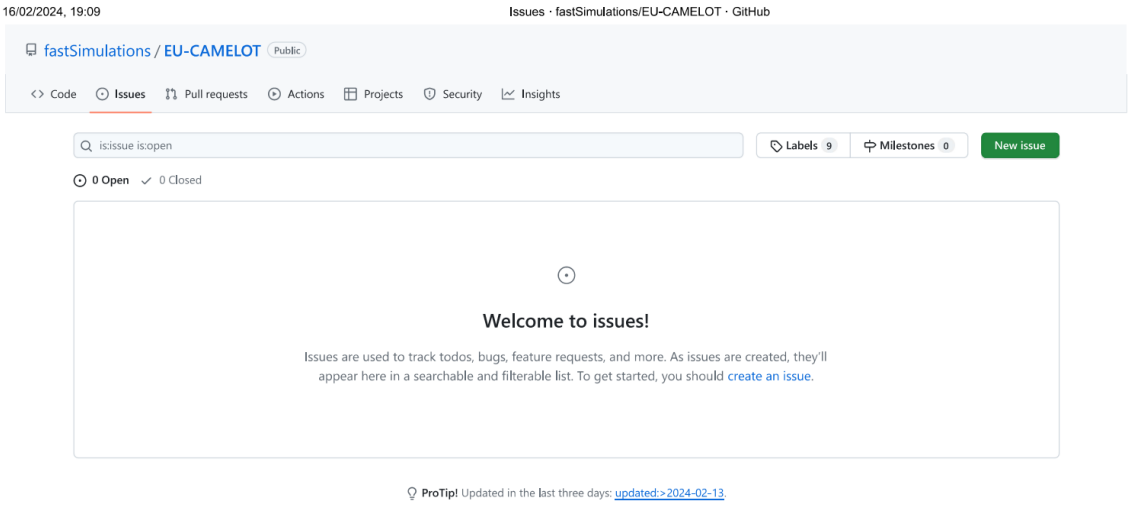

Figure 2: COMSOL-Based FAST-FC GitHub Repository Issue Tracking System.

5 CONCLUSIONS AND FUTURE WORK

The COMSOL-based version of FAST-FC which was updated and improved within WP2 of the project has been uploaded and placed into a public GitHub repository combined with an issue tracking system to provide management and resolution for user feedback and bug tracking.

6 REFERENCES

Not applicable.

7 APPENDIX

Not Applicable.

This project has received funding from the Fuel Cells and Hydrogen 2 Joint Undertaking (now Clean Hydrogen Partnership) under grant agreement No 875155. This Joint Undertaking receives support from the European Union's Horizon 2020 Research and Innovation program, Hydrogen Europe and Hydrogen Europe Research.