Software Requirements Specification for HGHC

W. Spencer Smith

January 27, 2026

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1 Reference Material

This section records information for easy reference.

1.1 Table of Units

The unit system used throughout is SI (Système International d'Unités). In addition to the basic units, several derived units are also used. For each unit, the Table of Units lists the symbol, a description, and the SI name.

Table 1: Table of Units

Symbol	Description	SI Name
$^{\circ}$C	temperature	centigrade
m	length	metre
W	power	watt

1.2 Table of Symbols

The symbols used in this document are summarized in the Table of Symbols along with their units. The choice of symbols was made to be consistent with the nuclear physics literature and with that used in the FP manual.

Table 2: Table of Symbols

Symbol	Description	Units
h_{b}	Initial coolant film conductance	–
h_{c}	Convective heat transfer coefficient between clad and coolant	$\frac{\text{W}}{\text{m}^2{}^{\circ}\text{C}}$
h_{g}	Effective heat transfer coefficient between clad and fuel surface	$\frac{\text{W}}{\text{m}^2{}^{\circ}\text{C}}$
h_{p}	Initial gap film conductance	–
k_{c}	Clad conductivity	–
τ_{c}	Clad thickness	–

2 Introduction

Heat transfer through the cladding of a nuclear fuel element influences performance and safety. Engineers therefore rely on dependable calculations of the heat transfer coefficients used for simulating the temperature. This document describes the requirements of a program called HGHC.

The following section provides an overview of the Software Requirements Specification (SRS) for HGHC. This section explains the purpose of this document.

3 Specific System Description

This section first presents the problem description, which gives a high-level view of the problem to be solved. This is followed by the solution characteristics specification, which presents the assumptions, theories, and definitions that are used.

3.1 Solution Characteristics Specification

The instance models that govern HGHC are presented in the Instance Model Section. The information to understand the meaning of the instance models and their derivation is also presented, so that the instance models can be verified.

3.1.1 Theoretical Models

There are no theoretical models.

3.1.2 General Definitions

There are no general definitions.

3.1.3 Data Definitions

This section collects and defines all the data needed to build the instance models.

Refname	DD:htTransCladFuel
Label	Effective heat transfer coefficient between clad and fuel surface
Symbol	h_{g}
Units	$\frac{\text{W}}{\text{m}^2{}^\circ\text{C}}$
Equation	$$h_{\text{g}}=\frac{2\,k_{\text{c}}\,h_{\text{p}}}{2\,k_{\text{c}}+\tau_{\text{c}}\,h_{\text{p}}}$$
Description	h_{g} is the effective heat transfer coefficient between clad and fuel surface ($\frac{\text{W}}{\text{m}^2{}^\circ\text{C}}$) k_{c} is the clad conductivity (Unitless) h_{p} is the initial gap film conductance (Unitless) τ_{c} is the clad thickness (Unitless)

Refname	DD:htTransCladCool
Label	Convective heat transfer coefficient between clad and coolant
Symbol	h_{c}
Units	$\frac{\text{W}}{\text{m}^2{}^\circ\text{C}}$
Equation	$$h_{\text{c}}=\frac{2\,k_{\text{c}}\,h_{\text{b}}}{2\,k_{\text{c}}+\tau_{\text{c}}\,h_{\text{b}}}$$
Description	h_{c} is the convective heat transfer coefficient between clad and coolant ($\frac{\text{W}}{\text{m}^2{}^\circ\text{C}}$) k_{c} is the clad conductivity (Unitless) h_{b} is the initial coolant film conductance (Unitless) τ_{c} is the clad thickness (Unitless)

3.1.4 Instance Models

There are no instance models.