

# Load case - stimulation surface leak

Oliasoft

## Abstract

In this document we describe the load case *Stimulation surface leak* available in the Oliasoft™ application.

## Introduction

Stimulation surface leak is a burst load case, where the unknown is the internal pressure profile of the tubing<sup>1</sup>. It models a tubing leak near the wellhead during injection.

**Inputs** The following inputs define the stimulation surface leak load case

- 1) The true vertical depth (TVD) along the wellbore as a function of measured depth. Alternatively, the wellbore described by a set of survey stations, with complete information about measured depth and inclination.
- 2) The true vertical depth/TVD of
  - a) The hanger of the tubing,  $TVD_{\text{hanger}}$ .
  - b) The shoe of the tubing,  $TVD_{\text{shoe}}$ .
  - c) The packer depth,  $TVD_{\text{packer}}$ .
- 3) The temperature profile of the wellbore,  $T$ .
- 4) The packer fluid density,  $\rho_{\text{pfl}}$ .
- 5) The injection pressure,  $P_{\text{inj}}$ .
- 6) The injection fluid density,  $\rho_{\text{inj}}$ .
- 7) The gravitation constant,  $g$ .

**Calculations** The hanger pressure is given by

$$P_{\text{hanger}} = P_{\text{inj}} + g\rho_{\text{inj}}TVD_{\text{hanger}}. \quad (1)$$

Then, from hanger to the minimum of the shoe and packer, the internal pressure is given by

$$P_i = P_{\text{hanger}} + g\rho_{\text{pfl}}(TVD - TVD_{\text{hanger}}), \quad TVD \in [TVD_{\text{hanger}}, \min(TVD_{\text{shoe}}, TVD_{\text{packer}})]. \quad (2)$$

If the shoe is deeper than the packer, then the internal pressure from packer to shoe is given by

$$P_i = P_{\text{inj}} + g\rho_{\text{inj}}TVD, \quad TVD \in [TVD_{\text{packer}}, TVD_{\text{shoe}}]. \quad (3)$$

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<sup>1</sup>We denote any tubular by tubing. All calculations encompass both tubings and casings.