

Silane Deposition: Introduction

CPFD Software

www.cpfd-software.com

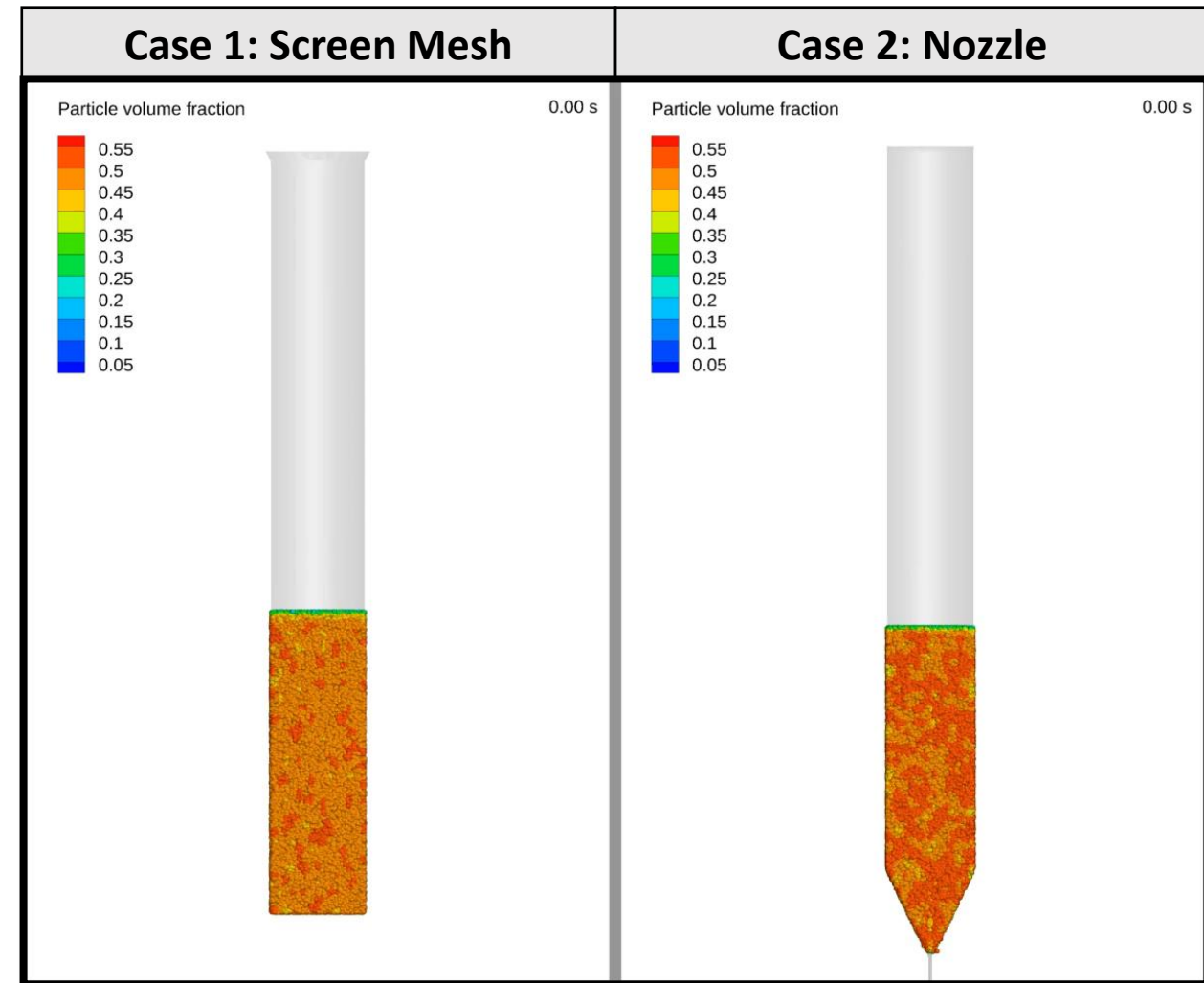
Overview

This example shows how to setup and run a comparison of two different geometries for the deposition of solid Silicon in a fluidized bed system.

- Case 1: Screen Mesh Geometry (uniform flow)
- Case 2: Nozzle Geometry (jet flow)

Simulation developed from previous work done by James Parker in 2011:

<https://cpfd-software.com/validation-of-a-polysilicon-deposition-reactor/>



Analysis: Silicon Deposition Rate

The average rate of Silicon deposition is compared for the two geometries

For a 57 mol% Silane feed, the deposition rate of Silicon is:

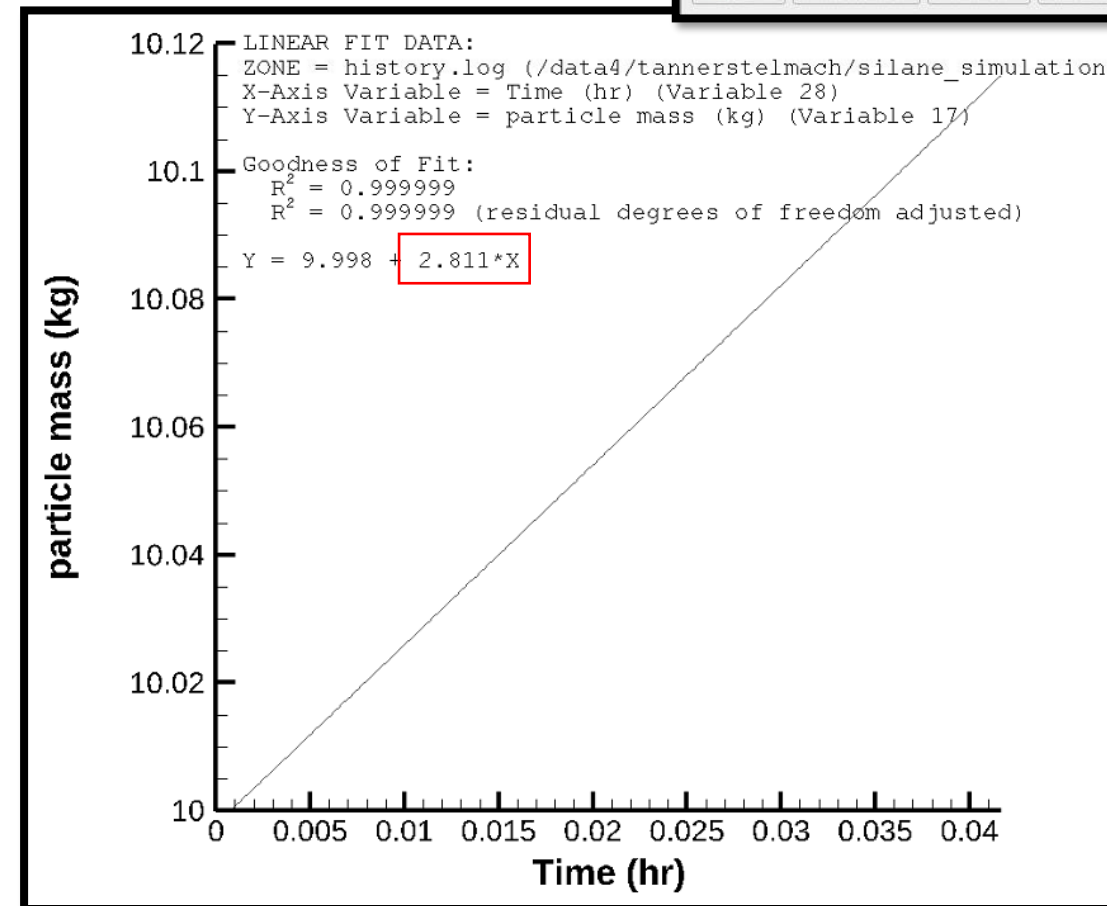
- Screen Mesh: **2.81 kg/hr**
- Nozzle: **1.81 kg/hr**

Mapping Style

Definitions Lines Curves Symbols Error Bars Bar Charts Indices

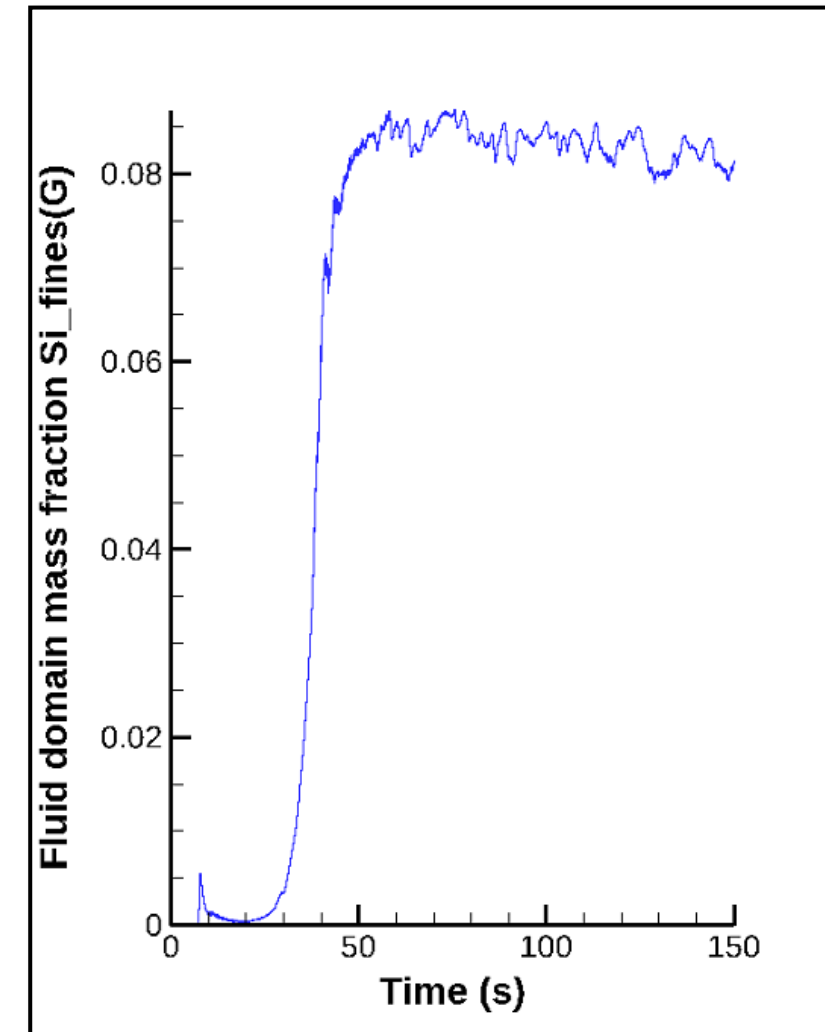
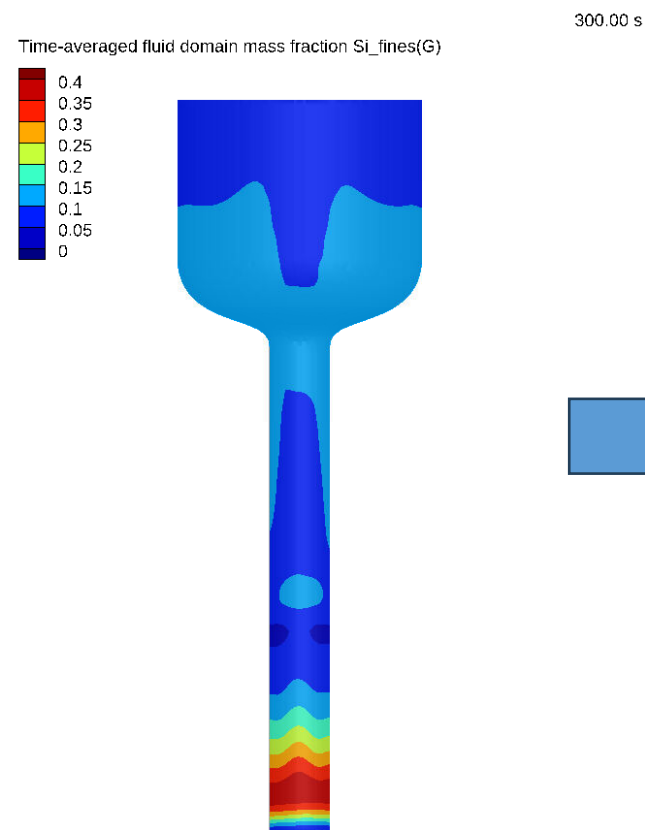
Map Number	Map Name	Show Map	X-Axis Variable	Y-Axis Variable	
16	particle mass (kg)	<input checked="" type="checkbox"/>	1: Time (s)	17: particle mass (...)	1: histor
17	warning count	<input type="checkbox"/>	1: Time (s)	18: warning count	1: histor
18	pVolFrac low count	<input type="checkbox"/>	1: Time (s)	19: pVolFrac low co...	1: histor
19	pVolFrac medium count	<input type="checkbox"/>	1: Time (s)	20: pVolFrac mediu...	1: histor
20	pVolFrac high count	<input type="checkbox"/>	1: Time (s)	21: pVolFrac high c...	1: histor
21	pVolFrac adjustment count	<input type="checkbox"/>	1: Time (s)	22: pVolFrac adjust...	1: histor

Selection criteria:



Analysis: Silicon fines production

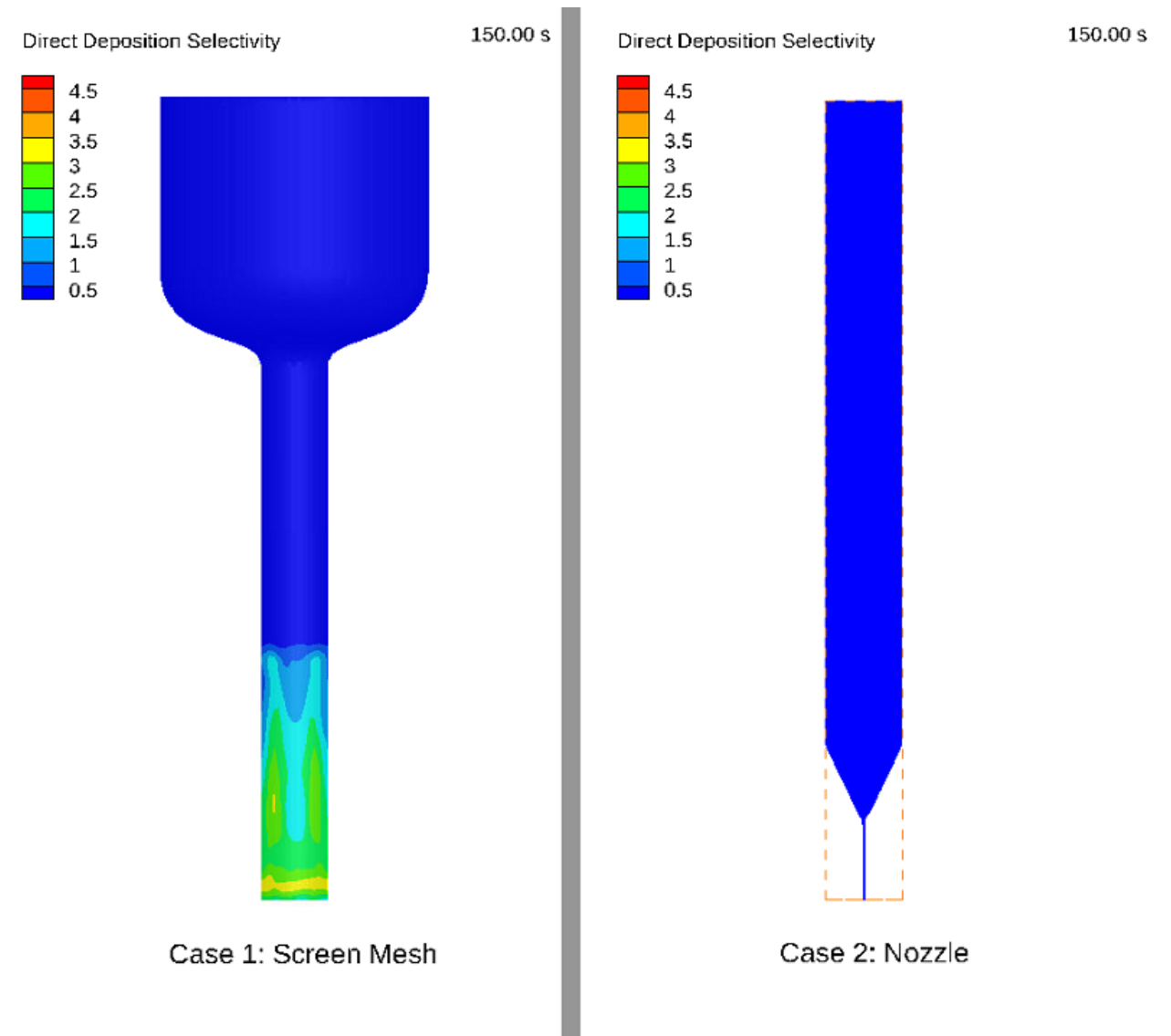
Silicon fines production will be calculated from a flux plane defined at the top of the reactor



Analysis: Direct Deposition Reaction Selectivity

Reaction rate outputs are used to spatially analyze the reaction selectivity of direct deposition

These results ultimately show that screen mesh configuration is favorable



Comparison with Experimental Data

Data for comparison: deposition rate and silicon fines production

