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SOLIDWORKS

Fluid Flow Simulation Project
Report

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1 General Information

Objective of the simulation: The purpose of this test is the check:

- The average pressure in an open gate-valve across the length of the body
- The static pressure at the inlet and the outlet of the valve
- The velocity of the fluid in the open valve
- The mass-flow rate of the fluid in the valve

1.1 Analysis Environment

Software Product: Flow Simulation 2015 SP4.0. Build: 3135
CPU Type: Intel(R) Pentium(R) CPU N3540 @ 2.16GHz
CPU Speed: 2159 MHz
RAM: 3978 MB / 134217727 MB
Operating System: (Build 9200)

1.2 Model Information

Model Name: Gate-Valve.SLDASM
Project Name: Basic Tests

1.3 Project Comments:

Unit System: SI (m-kg-s)
Analysis Type: Internal

1.4 Size of Computational Domain

Size

X min	0.020 m
X max	0.180 m
Y min	0.019 m
Y max	0.682 m
Z min	-0.351 m
Z max	0.091 m

1.5 Simulation Parameters

1.5.1 Mesh Settings

1.5.1.1 Basic Mesh

Basic Mesh Dimensions

Number of cells in X	4
Number of cells in Y	18
Number of cells in Z	12

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1.5.1.2 Analysis Mesh

Total Cell count:	3587
Fluid Cells:	743
Solid Cells:	1216
Partial Cells:	1628
Trimmed Cells:	0

1.5.1.3 Additional Physical Calculation Options

Heat Transfer Analysis:	Heat conduction in solids: Off
Flow Type:	Laminar and turbulent
Time-Dependent Analysis:	Off
Gravity:	Off
Radiation:	
Humidity:	
Default Wall Roughness:	0 micrometer

1.5.2 Material Settings

Material Settings

Fluids

[Water](#)

1.5.3 Initial Conditions

Initial Conditions

Thermodynamic parameters	Static Pressure: 101325.00 Pa Temperature: 293.20 K
Velocity parameters	Velocity vector Velocity in X direction: 0 m/s Velocity in Y direction: 0 m/s Velocity in Z direction: 0 m/s
Turbulence parameters	

1.5.4 Boundary Conditions

Boundary Conditions

Inlet Mass Flow 1

Type	Inlet Mass Flow
Faces	Face<1>@LID6-1
Coordinate system	Face Coordinate System
Reference axis	X
Flow parameters	Flow vectors direction: Normal to face Mass flow rate: 0.0800 kg/s Fully developed flow: No Inlet profile: 0
Thermodynamic parameters	Temperature: 293.20 K
Turbulence parameters	Boundary layer parameters

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Boundary layer type: Turbulent

Environment Pressure 1

Type	Environment Pressure
Faces	Face<3>@LID7-1
Coordinate system	Face Coordinate System
Reference axis	X
Thermodynamic parameters	Environment pressure: 101325.00 Pa Temperature: 293.20 K
Turbulence parameters	Boundary layer parameters
Boundary layer type: Turbulent	

1.5.5 Volumetric Heat Sources

1.5.6 Engineering Goals

Goals

Global Goals

GG Av Total Pressure 1

Type	Global Goal
Goal type	Total Pressure
Calculate	Average value
Coordinate system	Global coordinate system
Use in convergence	On

GG Av Static Pressure 1

Type	Global Goal
Goal type	Static Pressure
Calculate	Average value
Coordinate system	Global coordinate system
Use in convergence	On

GG Mass Flow Rate 1

Type	Global Goal
Goal type	Mass Flow Rate
Coordinate system	Global coordinate system
Use in convergence	On

Point Goals

PG Static Pressure 1

Type	Point Goal
Goal type	Static Pressure
Coordinate system	Global coordinate system
Name	Face<2>@Wedge-2
X	0.100 m
Y	0.262 m

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Z	-0.075 m
Use in convergence	On

Equation Goals

Equation Goal 1

Type	Equation Goal
Formula	GG Av Total Pressure 1-GG Av Static Pressure 1
Dimensionality	Pressure & stress
Use in convergence	On

1.6 Analysis Time

Calculation Time: 312 s

Number of Iterations: 75

Warnings:

2 Results

2.1 Analysis Goals

Goals

Name	Unit	Value	Progress	Use in convergence	Delta	Criteria
GG Av Total Pressure 1	Pa	101325.02	100	0.00101325021	0.000960650534	On
GG Av Static Pressure 1	Pa	101325.01	100	0.00101325009	0.000932769908	On
GG Mass Flow Rate 1	kg/s	-6.0137e-009	100	0.0016	1.98498911e-007	On
PG Static Pressure 1	Pa	101325.00	100	0.00238350456	0.00203061063	On
Equation Goal 1	Pa	0.01	100	0.000111317552	2.84228445e-005	On

2.2 Global Min-Max-Table

Min/Max Table

Name	Minimum	Maximum
Pressure [Pa]	101324.99	101325.02
Temperature [K]	293.20	293.20
Density (Fluid) [kg/m ³]	997.56	997.56
Velocity [m/s]	0	0.009
Velocity (X) [m/s]	-3.071e-004	3.209e-004
Velocity (Y) [m/s]	-2.620e-004	4.046e-004
Velocity (Z) [m/s]	-0.009	2.165e-004
Temperature (Fluid) [K]	293.20	293.20
Vorticity [1/s]	2.78e-006	0.58
Velocity RRF [m/s]	0	0.009
Velocity RRF (X) [m/s]	-3.071e-004	3.209e-004
Velocity RRF (Y) [m/s]	-2.620e-004	4.046e-004
Velocity RRF (Z) [m/s]	-0.009	2.165e-004
Shear Stress [Pa]	0	1.63e-003
Relative Pressure [Pa]	-0.01	0.02
Heat Transfer Coefficient [W/m ² /K]	0	0
Surface Heat Flux [W/m ²]	0	0

2.3 Results

2.4 Conclusion

This is a basic test to ascertain the conformity of manual testing of a gate-valve. Please note that no strict standard was maintained in the analysis.

3 Appendix

3.1 Material Data

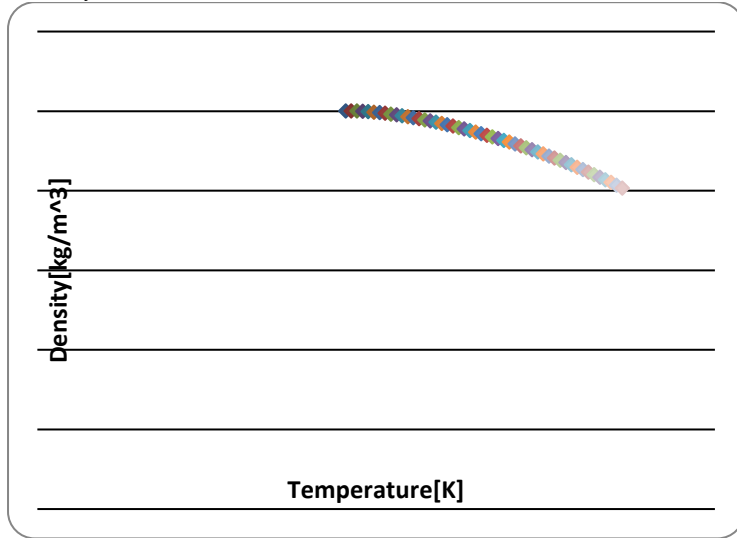
Engineering Database

Liquids

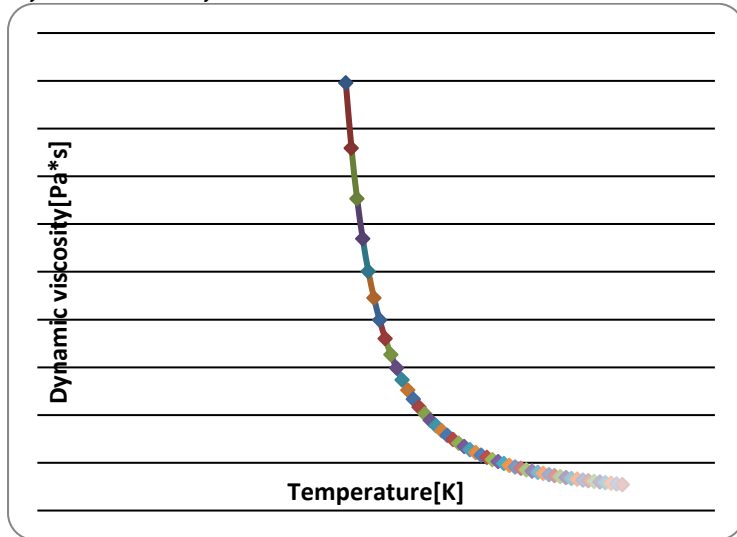
Water

Path: Liquids Pre-Defined

Density

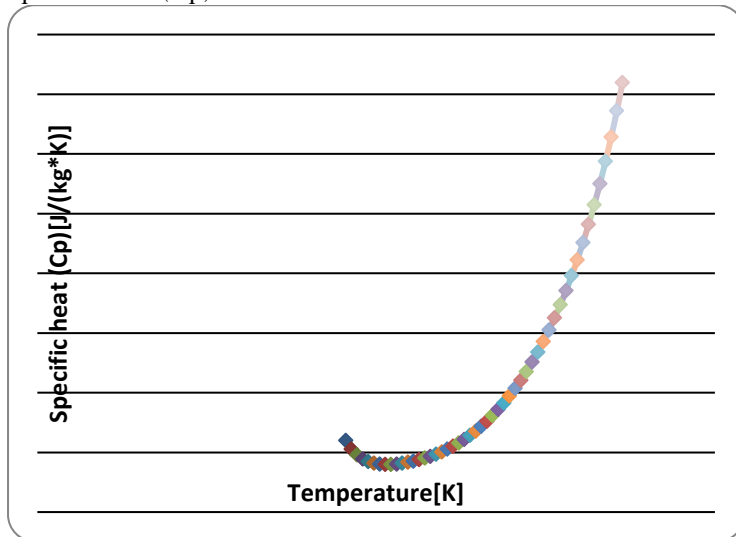


Dynamic viscosity

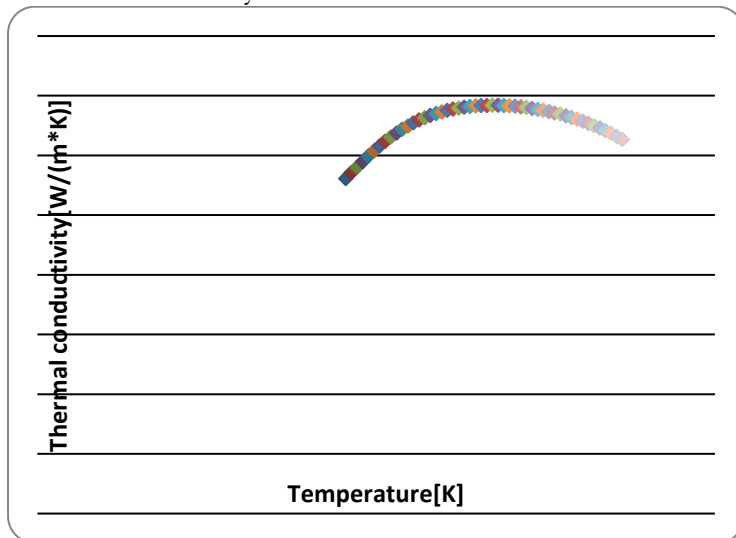


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Specific heat (Cp)



Thermal conductivity



Cavitation effect: Yes

Temperature: 0 K

Saturation pressure: 0 Pa