[](http://www.comsol.com/)

Ex5.4 NL Burg2D

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| Date | Aug 19, 2014 5:58:16 AM |

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1. Global

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| --- | --- |
| Date | Aug 18, 2014 7:07:34 AM |

Global settings

|  |  |
| --- | --- |
| Name | Ex5.4 NL Burg2D.mph |
| Path | /Users/gilliam/Desktop/collect\_15/research\_15/geo\_reg\_mono\_eugenio/Mono\_1\_15/Comsol\_EX\_GitHub/Chapter5/Chap5Ex4\_NLFourier\_2D\_Burg/Ex5.4\_NL\_Burg2D.mph |
| Program | COMSOL 4.4 (Build: 150) |

Used products

|  |
| --- |
| COMSOL Multiphysics |

* 1. Definitions
     1. Parameters 1

Parameters

| **Name** | **Expression** | **Value** | **Description** |
| --- | --- | --- | --- |
| nu | 1 | 1.0000 |  |
| L | 1 | 1.0000 |  |
| K | 5 | 5.0000 |  |
| alpha | 1 | 1.0000 |  |
| M1 | 0.1 | 0.10000 |  |
| M2 | 0.2 | 0.20000 |  |
| A1 | 0.2 | 0.20000 |  |
| A2 | 0.1 | 0.10000 |  |
| N | 5 | 5.0000 |  |

1. Component 1

Component settings

|  |  |
| --- | --- |
| Unit system | None |

* 1. Definitions
     1. Variables

#### Variables 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Entire model |

| **Name** | **Expression** | **Description** |
| --- | --- | --- |
| G | C(Xu) |  |
| e | yr - C(u) |  |

#### Variables 2a

Selection

|  |  |
| --- | --- |
| Geometric entity level | Entire model |

| **Name** | **Expression** | **Description** |
| --- | --- | --- |
| f\_au0 | -0.5\*(au0\*au0x + 2.\*au1\*au1x + 2.\*au2\*au2x + 2.\*au3\*au3x + 2.\*au4\*au4x + 2.\*au5\*au5x + 2.\*bu1\*bu1x + 2.\*bu2\*bu2x + 2.\*bu3\*bu3x + 2.\*bu4\*bu4x + 2.\*bu5\*bu5x + av0\*au0y + 2.\*av1\*au1y + 2.\*av2\*au2y + 2.\*av3\*au3y + 2.\*av4\*au4y + 2.\*av5\*au5y + 2.\*bv1\*bu1y + 2.\*bv2\*bu2y + 2.\*bv3\*bu3y + 2.\*bv4\*bu4y + 2.\*bv5\*bu5y) |  |
| f\_av0 | -0.5\*(au0\*av0x + 2.\*au1\*av1x + 2.\*au2\*av2x + 2.\*au3\*av3x + 2.\*au4\*av4x + 2.\*au5\*av5x + 2.\*bu1\*bv1x + 2.\*bu2\*bv2x + 2.\*bu3\*bv3x + 2.\*bu4\*bv4x + 2.\*bu5\*bv5x + av0\*av0y + 2.\*av1\*av1y + 2.\*av2\*av2y + 2.\*av3\*av3y + 2.\*av4\*av4y + 2.\*av5\*av5y + 2.\*bv1\*bv1y + 2.\*bv2\*bv2y + 2.\*bv3\*bv3y + 2.\*bv4\*bv4y + 2.\*bv5\*bv5y) |  |
| f\_au1 | -0.5\*(au0\*au1x + au1\*au0x + 0.5\*au1\*au2x + 0.5\*au2\*au1x + 0.5\*au2\*au1x + 0.5\*au1\*au2x + 0.5\*au2\*au3x + 0.5\*au3\*au2x + 0.5\*au3\*au2x + 0.5\*au2\*au3x + 0.5\*au3\*au4x + 0.5\*au4\*au3x + 0.5\*au4\*au3x + 0.5\*au3\*au4x + 0.5\*au4\*au5x + 0.5\*au5\*au4x + 0.5\*au5\*au4x + 0.5\*au4\*au5x + 0.5\*bu1\*bu2x + 0.5\*bu2\*bu1x + 0.5\*bu2\*bu1x + 0.5\*bu1\*bu2x + 0.5\*bu2\*bu3x + 0.5\*bu3\*bu2x + 0.5\*bu3\*bu2x + 0.5\*bu2\*bu3x + 0.5\*bu3\*bu4x + 0.5\*bu4\*bu3x + 0.5\*bu4\*bu3x + 0.5\*bu3\*bu4x + 0.5\*bu4\*bu5x + 0.5\*bu5\*bu4x + 0.5\*bu5\*bu4x + 0.5\*bu4\*bu5x + av0\*au1y + av1\*au0y + 0.5\*av1\*au2y + 0.5\*av2\*au1y + 0.5\*av2\*au1y + 0.5\*av1\*au2y + 0.5\*av2\*au3y + 0.5\*av3\*au2y + 0.5\*av3\*au2y + 0.5\*av2\*au3y + 0.5\*av3\*au4y + 0.5\*av4\*au3y + 0.5\*av4\*au3y + 0.5\*av3\*au4y + 0.5\*av4\*au5y + 0.5\*av5\*au4y + 0.5\*av5\*au4y + 0.5\*av4\*au5y + 0.5\*bv1\*bu2y + 0.5\*bv2\*bu1y + 0.5\*bv2\*bu1y + 0.5\*bv1\*bu2y + 0.5\*bv2\*bu3y + 0.5\*bv3\*bu2y + 0.5\*bv3\*bu2y + 0.5\*bv2\*bu3y + 0.5\*bv3\*bu4y + 0.5\*bv4\*bu3y + 0.5\*bv4\*bu3y + 0.5\*bv3\*bu4y + 0.5\*bv4\*bu5y + 0.5\*bv5\*bu4y + 0.5\*bv5\*bu4y + 0.5\*bv4\*bu5y)\*(N>0) |  |
| f\_bu1 | -0.5\*(au0\*bu1x + bu1\*au0x + au1\*bu2x + bu2\*au1x - au2\*bu1x - bu1\*au2x + au2\*bu3x + bu3\*au2x - au3\*bu2x - bu2\*au3x + au3\*bu4x + bu4\*au3x - au4\*bu3x - bu3\*au4x + au4\*bu5x + bu5\*au4x - au5\*bu4x - bu4\*au5x + av0\*bu1y + bv1\*au0y + av1\*bu2y + bv2\*au1y - av2\*bu1y - bv1\*au2y + av2\*bu3y + bv3\*au2y - av3\*bu2y - bv2\*au3y + av3\*bu4y + bv4\*au3y - av4\*bu3y - bv3\*au4y + av4\*bu5y + bv5\*au4y - av5\*bu4y - bv4\*au5y)\*(N>0) |  |
| f\_av1 | -0.5\*(au0\*av1x + au1\*av0x + 0.5\*au1\*av2x + 0.5\*au2\*av1x + 0.5\*au2\*av1x + 0.5\*au1\*av2x + 0.5\*au2\*av3x + 0.5\*au3\*av2x + 0.5\*au3\*av2x + 0.5\*au2\*av3x + 0.5\*au3\*av4x + 0.5\*au4\*av3x + 0.5\*au4\*av3x + 0.5\*au3\*av4x + 0.5\*au4\*av5x + 0.5\*au5\*av4x + 0.5\*au5\*av4x + 0.5\*au4\*av5x + 0.5\*bu1\*bv2x + 0.5\*bu2\*bv1x + 0.5\*bu2\*bv1x + 0.5\*bu1\*bv2x + 0.5\*bu2\*bv3x + 0.5\*bu3\*bv2x + 0.5\*bu3\*bv2x + 0.5\*bu2\*bv3x + 0.5\*bu3\*bv4x + 0.5\*bu4\*bv3x + 0.5\*bu4\*bv3x + 0.5\*bu3\*bv4x + 0.5\*bu4\*bv5x + 0.5\*bu5\*bv4x + 0.5\*bu5\*bv4x + 0.5\*bu4\*bv5x + av0\*av1y + av1\*av0y + 0.5\*av1\*av2y + 0.5\*av2\*av1y + 0.5\*av2\*av1y + 0.5\*av1\*av2y + 0.5\*av2\*av3y + 0.5\*av3\*av2y + 0.5\*av3\*av2y + 0.5\*av2\*av3y + 0.5\*av3\*av4y + 0.5\*av4\*av3y + 0.5\*av4\*av3y + 0.5\*av3\*av4y + 0.5\*av4\*av5y + 0.5\*av5\*av4y + 0.5\*av5\*av4y + 0.5\*av4\*av5y + 0.5\*bv1\*bv2y + 0.5\*bv2\*bv1y + 0.5\*bv2\*bv1y + 0.5\*bv1\*bv2y + 0.5\*bv2\*bv3y + 0.5\*bv3\*bv2y + 0.5\*bv3\*bv2y + 0.5\*bv2\*bv3y + 0.5\*bv3\*bv4y + 0.5\*bv4\*bv3y + 0.5\*bv4\*bv3y + 0.5\*bv3\*bv4y + 0.5\*bv4\*bv5y + 0.5\*bv5\*bv4y + 0.5\*bv5\*bv4y + 0.5\*bv4\*bv5y)\*(N>0) |  |
| f\_bv1 | -0.5\*(au0\*bv1x + bu1\*av0x + au1\*bv2x + bu2\*av1x - au2\*bv1x - bu1\*av2x + au2\*bv3x + bu3\*av2x - au3\*bv2x - bu2\*av3x + au3\*bv4x + bu4\*av3x - au4\*bv3x - bu3\*av4x + au4\*bv5x + bu5\*av4x - au5\*bv4x - bu4\*av5x + av0\*bv1y + bv1\*av0y + av1\*bv2y + bv2\*av1y - av2\*bv1y - bv1\*av2y + av2\*bv3y + bv3\*av2y - av3\*bv2y - bv2\*av3y + av3\*bv4y + bv4\*av3y - av4\*bv3y - bv3\*av4y + av4\*bv5y + bv5\*av4y - av5\*bv4y - bv4\*av5y)\*(N>0) |  |
| f\_au2 | -0.5\*(au0\*au2x + au2\*au0x + 0.5\*au1\*au1x + 0.5\*au1\*au1x + 0.5\*au1\*au3x + 0.5\*au3\*au1x + 0.5\*au2\*au4x + 0.5\*au4\*au2x + 0.5\*au3\*au1x + 0.5\*au1\*au3x + 0.5\*au3\*au5x + 0.5\*au5\*au3x + 0.5\*au4\*au2x + 0.5\*au2\*au4x + 0.5\*au5\*au3x + 0.5\*au3\*au5x - 0.5\*bu1\*bu1x - 0.5\*bu1\*bu1x + 0.5\*bu1\*bu3x + 0.5\*bu3\*bu1x + 0.5\*bu2\*bu4x + 0.5\*bu4\*bu2x + 0.5\*bu3\*bu1x + 0.5\*bu1\*bu3x + 0.5\*bu3\*bu5x + 0.5\*bu5\*bu3x + 0.5\*bu4\*bu2x + 0.5\*bu2\*bu4x + 0.5\*bu5\*bu3x + 0.5\*bu3\*bu5x + av0\*au2y + av2\*au0y + 0.5\*av1\*au1y + 0.5\*av1\*au1y + 0.5\*av1\*au3y + 0.5\*av3\*au1y + 0.5\*av2\*au4y + 0.5\*av4\*au2y + 0.5\*av3\*au1y + 0.5\*av1\*au3y + 0.5\*av3\*au5y + 0.5\*av5\*au3y + 0.5\*av4\*au2y + 0.5\*av2\*au4y + 0.5\*av5\*au3y + 0.5\*av3\*au5y - 0.5\*bv1\*bu1y - 0.5\*bv1\*bu1y + 0.5\*bv1\*bu3y + 0.5\*bv3\*bu1y + 0.5\*bv2\*bu4y + 0.5\*bv4\*bu2y + 0.5\*bv3\*bu1y + 0.5\*bv1\*bu3y + 0.5\*bv3\*bu5y + 0.5\*bv5\*bu3y + 0.5\*bv4\*bu2y + 0.5\*bv2\*bu4y + 0.5\*bv5\*bu3y + 0.5\*bv3\*bu5y)\*(N>1) |  |
| f\_bu2 | -0.5\*(au0\*bu2x + bu2\*au0x + au1\*bu1x + bu1\*au1x + au1\*bu3x + bu3\*au1x + au2\*bu4x + bu4\*au2x - au3\*bu1x - bu1\*au3x + au3\*bu5x + bu5\*au3x - au4\*bu2x - bu2\*au4x - au5\*bu3x - bu3\*au5x + av0\*bu2y + bv2\*au0y + av1\*bu1y + bv1\*au1y + av1\*bu3y + bv3\*au1y + av2\*bu4y + bv4\*au2y - av3\*bu1y - bv1\*au3y + av3\*bu5y + bv5\*au3y - av4\*bu2y - bv2\*au4y - av5\*bu3y - bv3\*au5y)\*(N>1) |  |
| f\_av2 | -0.5\*(au0\*av2x + au2\*av0x + 0.5\*au1\*av1x + 0.5\*au1\*av1x + 0.5\*au1\*av3x + 0.5\*au3\*av1x + 0.5\*au2\*av4x + 0.5\*au4\*av2x + 0.5\*au3\*av1x + 0.5\*au1\*av3x + 0.5\*au3\*av5x + 0.5\*au5\*av3x + 0.5\*au4\*av2x + 0.5\*au2\*av4x + 0.5\*au5\*av3x + 0.5\*au3\*av5x - 0.5\*bu1\*bv1x - 0.5\*bu1\*bv1x + 0.5\*bu1\*bv3x + 0.5\*bu3\*bv1x + 0.5\*bu2\*bv4x + 0.5\*bu4\*bv2x + 0.5\*bu3\*bv1x + 0.5\*bu1\*bv3x + 0.5\*bu3\*bv5x + 0.5\*bu5\*bv3x + 0.5\*bu4\*bv2x + 0.5\*bu2\*bv4x + 0.5\*bu5\*bv3x + 0.5\*bu3\*bv5x + av0\*av2y + av2\*av0y + 0.5\*av1\*av1y + 0.5\*av1\*av1y + 0.5\*av1\*av3y + 0.5\*av3\*av1y + 0.5\*av2\*av4y + 0.5\*av4\*av2y + 0.5\*av3\*av1y + 0.5\*av1\*av3y + 0.5\*av3\*av5y + 0.5\*av5\*av3y + 0.5\*av4\*av2y + 0.5\*av2\*av4y + 0.5\*av5\*av3y + 0.5\*av3\*av5y - 0.5\*bv1\*bv1y - 0.5\*bv1\*bv1y + 0.5\*bv1\*bv3y + 0.5\*bv3\*bv1y + 0.5\*bv2\*bv4y + 0.5\*bv4\*bv2y + 0.5\*bv3\*bv1y + 0.5\*bv1\*bv3y + 0.5\*bv3\*bv5y + 0.5\*bv5\*bv3y + 0.5\*bv4\*bv2y + 0.5\*bv2\*bv4y + 0.5\*bv5\*bv3y + 0.5\*bv3\*bv5y)\*(N>1) |  |
| f\_bv2 | -0.5\*(au0\*bv2x + bu2\*av0x + au1\*bv1x + bu1\*av1x + au1\*bv3x + bu3\*av1x + au2\*bv4x + bu4\*av2x - au3\*bv1x - bu1\*av3x + au3\*bv5x + bu5\*av3x - au4\*bv2x - bu2\*av4x - au5\*bv3x - bu3\*av5x + av0\*bv2y + bv2\*av0y + av1\*bv1y + bv1\*av1y + av1\*bv3y + bv3\*av1y + av2\*bv4y + bv4\*av2y - av3\*bv1y - bv1\*av3y + av3\*bv5y + bv5\*av3y - av4\*bv2y - bv2\*av4y - av5\*bv3y - bv3\*av5y)\*(N>1) |  |
| f\_au3 | -0.5\*(au0\*au3x + au3\*au0x + 0.5\*au1\*au2x + 0.5\*au2\*au1x + 0.5\*au1\*au4x + 0.5\*au4\*au1x + 0.5\*au2\*au1x + 0.5\*au1\*au2x + 0.5\*au2\*au5x + 0.5\*au5\*au2x + 0.5\*au4\*au1x + 0.5\*au1\*au4x + 0.5\*au5\*au2x + 0.5\*au2\*au5x - 0.5\*bu1\*bu2x - 0.5\*bu2\*bu1x + 0.5\*bu1\*bu4x + 0.5\*bu4\*bu1x - 0.5\*bu2\*bu1x - 0.5\*bu1\*bu2x + 0.5\*bu2\*bu5x + 0.5\*bu5\*bu2x + 0.5\*bu4\*bu1x + 0.5\*bu1\*bu4x + 0.5\*bu5\*bu2x + 0.5\*bu2\*bu5x + av0\*au3y + av3\*au0y + 0.5\*av1\*au2y + 0.5\*av2\*au1y + 0.5\*av1\*au4y + 0.5\*av4\*au1y + 0.5\*av2\*au1y + 0.5\*av1\*au2y + 0.5\*av2\*au5y + 0.5\*av5\*au2y + 0.5\*av4\*au1y + 0.5\*av1\*au4y + 0.5\*av5\*au2y + 0.5\*av2\*au5y - 0.5\*bv1\*bu2y - 0.5\*bv2\*bu1y + 0.5\*bv1\*bu4y + 0.5\*bv4\*bu1y - 0.5\*bv2\*bu1y - 0.5\*bv1\*bu2y + 0.5\*bv2\*bu5y + 0.5\*bv5\*bu2y + 0.5\*bv4\*bu1y + 0.5\*bv1\*bu4y + 0.5\*bv5\*bu2y + 0.5\*bv2\*bu5y)\*(N>2) |  |
| f\_bu3 | -0.5\*(au0\*bu3x + bu3\*au0x + au1\*bu2x + bu2\*au1x + au1\*bu4x + bu4\*au1x + au2\*bu1x + bu1\*au2x + au2\*bu5x + bu5\*au2x - au4\*bu1x - bu1\*au4x - au5\*bu2x - bu2\*au5x + av0\*bu3y + bv3\*au0y + av1\*bu2y + bv2\*au1y + av1\*bu4y + bv4\*au1y + av2\*bu1y + bv1\*au2y + av2\*bu5y + bv5\*au2y - av4\*bu1y - bv1\*au4y - av5\*bu2y - bv2\*au5y)\*(N>2) |  |
| f\_av3 | -0.5\*(au0\*av3x + au3\*av0x + 0.5\*au1\*av2x + 0.5\*au2\*av1x + 0.5\*au1\*av4x + 0.5\*au4\*av1x + 0.5\*au2\*av1x + 0.5\*au1\*av2x + 0.5\*au2\*av5x + 0.5\*au5\*av2x + 0.5\*au4\*av1x + 0.5\*au1\*av4x + 0.5\*au5\*av2x + 0.5\*au2\*av5x - 0.5\*bu1\*bv2x - 0.5\*bu2\*bv1x + 0.5\*bu1\*bv4x + 0.5\*bu4\*bv1x - 0.5\*bu2\*bv1x - 0.5\*bu1\*bv2x + 0.5\*bu2\*bv5x + 0.5\*bu5\*bv2x + 0.5\*bu4\*bv1x + 0.5\*bu1\*bv4x + 0.5\*bu5\*bv2x + 0.5\*bu2\*bv5x + av0\*av3y + av3\*av0y + 0.5\*av1\*av2y + 0.5\*av2\*av1y + 0.5\*av1\*av4y + 0.5\*av4\*av1y + 0.5\*av2\*av1y + 0.5\*av1\*av2y + 0.5\*av2\*av5y + 0.5\*av5\*av2y + 0.5\*av4\*av1y + 0.5\*av1\*av4y + 0.5\*av5\*av2y + 0.5\*av2\*av5y - 0.5\*bv1\*bv2y - 0.5\*bv2\*bv1y + 0.5\*bv1\*bv4y + 0.5\*bv4\*bv1y - 0.5\*bv2\*bv1y - 0.5\*bv1\*bv2y + 0.5\*bv2\*bv5y + 0.5\*bv5\*bv2y + 0.5\*bv4\*bv1y + 0.5\*bv1\*bv4y + 0.5\*bv5\*bv2y + 0.5\*bv2\*bv5y)\*(N>2) |  |
| f\_bv3 | -0.5\*(au0\*bv3x + bu3\*av0x + au1\*bv2x + bu2\*av1x + au1\*bv4x + bu4\*av1x + au2\*bv1x + bu1\*av2x + au2\*bv5x + bu5\*av2x - au4\*bv1x - bu1\*av4x - au5\*bv2x - bu2\*av5x + av0\*bv3y + bv3\*av0y + av1\*bv2y + bv2\*av1y + av1\*bv4y + bv4\*av1y + av2\*bv1y + bv1\*av2y + av2\*bv5y + bv5\*av2y - av4\*bv1y - bv1\*av4y - av5\*bv2y - bv2\*av5y)\*(N>2) |  |
| f\_au4 | -0.5\*(au0\*au4x + au4\*au0x + 0.5\*au1\*au3x + 0.5\*au3\*au1x + 0.5\*au1\*au5x + 0.5\*au5\*au1x + 0.5\*au2\*au2x + 0.5\*au2\*au2x + 0.5\*au3\*au1x + 0.5\*au1\*au3x + 0.5\*au5\*au1x + 0.5\*au1\*au5x - 0.5\*bu1\*bu3x - 0.5\*bu3\*bu1x + 0.5\*bu1\*bu5x + 0.5\*bu5\*bu1x - 0.5\*bu2\*bu2x - 0.5\*bu2\*bu2x - 0.5\*bu3\*bu1x - 0.5\*bu1\*bu3x + 0.5\*bu5\*bu1x + 0.5\*bu1\*bu5x + av0\*au4y + av4\*au0y + 0.5\*av1\*au3y + 0.5\*av3\*au1y + 0.5\*av1\*au5y + 0.5\*av5\*au1y + 0.5\*av2\*au2y + 0.5\*av2\*au2y + 0.5\*av3\*au1y + 0.5\*av1\*au3y + 0.5\*av5\*au1y + 0.5\*av1\*au5y - 0.5\*bv1\*bu3y - 0.5\*bv3\*bu1y + 0.5\*bv1\*bu5y + 0.5\*bv5\*bu1y - 0.5\*bv2\*bu2y - 0.5\*bv2\*bu2y - 0.5\*bv3\*bu1y - 0.5\*bv1\*bu3y + 0.5\*bv5\*bu1y + 0.5\*bv1\*bu5y)\*(N>3) |  |
| f\_bu4 | -0.5\*(au0\*bu4x + bu4\*au0x + au1\*bu3x + bu3\*au1x + au1\*bu5x + bu5\*au1x + au2\*bu2x + bu2\*au2x + au3\*bu1x + bu1\*au3x - au5\*bu1x - bu1\*au5x + av0\*bu4y + bv4\*au0y + av1\*bu3y + bv3\*au1y + av1\*bu5y + bv5\*au1y + av2\*bu2y + bv2\*au2y + av3\*bu1y + bv1\*au3y - av5\*bu1y - bv1\*au5y)\*(N>3) |  |
| f\_av4 | -0.5\*(au0\*av4x + au4\*av0x + 0.5\*au1\*av3x + 0.5\*au3\*av1x + 0.5\*au1\*av5x + 0.5\*au5\*av1x + 0.5\*au2\*av2x + 0.5\*au2\*av2x + 0.5\*au3\*av1x + 0.5\*au1\*av3x + 0.5\*au5\*av1x + 0.5\*au1\*av5x - 0.5\*bu1\*bv3x - 0.5\*bu3\*bv1x + 0.5\*bu1\*bv5x + 0.5\*bu5\*bv1x - 0.5\*bu2\*bv2x - 0.5\*bu2\*bv2x - 0.5\*bu3\*bv1x - 0.5\*bu1\*bv3x + 0.5\*bu5\*bv1x + 0.5\*bu1\*bv5x + av0\*av4y + av4\*av0y + 0.5\*av1\*av3y + 0.5\*av3\*av1y + 0.5\*av1\*av5y + 0.5\*av5\*av1y + 0.5\*av2\*av2y + 0.5\*av2\*av2y + 0.5\*av3\*av1y + 0.5\*av1\*av3y + 0.5\*av5\*av1y + 0.5\*av1\*av5y - 0.5\*bv1\*bv3y - 0.5\*bv3\*bv1y + 0.5\*bv1\*bv5y + 0.5\*bv5\*bv1y - 0.5\*bv2\*bv2y - 0.5\*bv2\*bv2y - 0.5\*bv3\*bv1y - 0.5\*bv1\*bv3y + 0.5\*bv5\*bv1y + 0.5\*bv1\*bv5y)\*(N>3) |  |
| f\_bv4 | -0.5\*(au0\*bv4x + bu4\*av0x + au1\*bv3x + bu3\*av1x + au1\*bv5x + bu5\*av1x + au2\*bv2x + bu2\*av2x + au3\*bv1x + bu1\*av3x - au5\*bv1x - bu1\*av5x + av0\*bv4y + bv4\*av0y + av1\*bv3y + bv3\*av1y + av1\*bv5y + bv5\*av1y + av2\*bv2y + bv2\*av2y + av3\*bv1y + bv1\*av3y - av5\*bv1y - bv1\*av5y)\*(N>3) |  |
| f\_au5 | -0.5\*(au0\*au5x + au5\*au0x + 0.5\*au1\*au4x + 0.5\*au4\*au1x + 0.5\*au2\*au3x + 0.5\*au3\*au2x + 0.5\*au3\*au2x + 0.5\*au2\*au3x + 0.5\*au4\*au1x + 0.5\*au1\*au4x - 0.5\*bu1\*bu4x - 0.5\*bu4\*bu1x - 0.5\*bu2\*bu3x - 0.5\*bu3\*bu2x - 0.5\*bu3\*bu2x - 0.5\*bu2\*bu3x - 0.5\*bu4\*bu1x - 0.5\*bu1\*bu4x + av0\*au5y + av5\*au0y + 0.5\*av1\*au4y + 0.5\*av4\*au1y + 0.5\*av2\*au3y + 0.5\*av3\*au2y + 0.5\*av3\*au2y + 0.5\*av2\*au3y + 0.5\*av4\*au1y + 0.5\*av1\*au4y - 0.5\*bv1\*bu4y - 0.5\*bv4\*bu1y - 0.5\*bv2\*bu3y - 0.5\*bv3\*bu2y - 0.5\*bv3\*bu2y - 0.5\*bv2\*bu3y - 0.5\*bv4\*bu1y - 0.5\*bv1\*bu4y)\*(N>4) |  |
| f\_bu5 | -0.5\*(au0\*bu5x + bu5\*au0x + au1\*bu4x + bu4\*au1x + au2\*bu3x + bu3\*au2x + au3\*bu2x + bu2\*au3x + au4\*bu1x + bu1\*au4x + av0\*bu5y + bv5\*au0y + av1\*bu4y + bv4\*au1y + av2\*bu3y + bv3\*au2y + av3\*bu2y + bv2\*au3y + av4\*bu1y + bv1\*au4y)\*(N>4) |  |
| f\_av5 | -0.5\*(au0\*av5x + au5\*av0x + 0.5\*au1\*av4x + 0.5\*au4\*av1x + 0.5\*au2\*av3x + 0.5\*au3\*av2x + 0.5\*au3\*av2x + 0.5\*au2\*av3x + 0.5\*au4\*av1x + 0.5\*au1\*av4x - 0.5\*bu1\*bv4x - 0.5\*bu4\*bv1x - 0.5\*bu2\*bv3x - 0.5\*bu3\*bv2x - 0.5\*bu3\*bv2x - 0.5\*bu2\*bv3x - 0.5\*bu4\*bv1x - 0.5\*bu1\*bv4x + av0\*av5y + av5\*av0y + 0.5\*av1\*av4y + 0.5\*av4\*av1y + 0.5\*av2\*av3y + 0.5\*av3\*av2y + 0.5\*av3\*av2y + 0.5\*av2\*av3y + 0.5\*av4\*av1y + 0.5\*av1\*av4y - 0.5\*bv1\*bv4y - 0.5\*bv4\*bv1y - 0.5\*bv2\*bv3y - 0.5\*bv3\*bv2y - 0.5\*bv3\*bv2y - 0.5\*bv2\*bv3y - 0.5\*bv4\*bv1y - 0.5\*bv1\*bv4y)\*(N>4) |  |
| f\_bv5 | -0.5\*(au0\*bv5x + bu5\*av0x + au1\*bv4x + bu4\*av1x + au2\*bv3x + bu3\*av2x + au3\*bv2x + bu2\*av3x + au4\*bv1x + bu1\*av4x + av0\*bv5y + bv5\*av0y + av1\*bv4y + bv4\*av1y + av2\*bv3y + bv3\*av2y + av3\*bv2y + bv2\*av3y + av4\*bv1y + bv1\*av4y)\*(N>4) |  |
| d\_a0 | 2\*M2 |  |
| d\_a1 | 0\*(N>0) |  |
| d\_b1 | A2\*(N>0) |  |
| d\_a2 | 0\*(N>1) |  |
| d\_b2 | 0\*(N>1) |  |
| d\_a3 | 0\*(N>2) |  |
| d\_b3 | 0\*(N>2) |  |
| d\_a4 | 0\*(N>3) |  |
| d\_b4 | 0\*(N>3) |  |
| d\_a5 | 0\*(N>4) |  |
| d\_b5 | 0\*(N>4) |  |
| d | M2 + A2\*sin(alpha\*t) |  |
| Gamma\_a0 | (2\*M1 - C(atu0))/G |  |
| Gamma\_a1 | (0 - C(atu1))/G\*(N>0) |  |
| Gamma\_b1 | (A1 - C(btu1))/G\*(N>0) |  |
| Gamma\_a2 | (0 - C(atu2))/G\*(N>1) |  |
| Gamma\_b2 | (0 - C(btu2))/G\*(N>1) |  |
| Gamma\_a3 | (0 - C(atu3))/G\*(N>2) |  |
| Gamma\_b3 | (0 - C(btu3))/G\*(N>2) |  |
| Gamma\_a4 | (0 - C(atu4))/G\*(N>3) |  |
| Gamma\_b4 | (0 - C(btu4))/G\*(N>3) |  |
| Gamma\_a5 | (0 - C(atu5))/G\*(N>4) |  |
| Gamma\_b5 | (0 - C(btu5))/G\*(N>4) |  |
| gamma | 0.5\*Gamma\_a0 + Gamma\_a1\*cos(alpha\*1\*t) + Gamma\_b1\*sin(alpha\*1\*t) + Gamma\_a2\*cos(alpha\*2\*t) + Gamma\_b2\*sin(alpha\*2\*t) + Gamma\_a3\*cos(alpha\*3\*t) + Gamma\_b3\*sin(alpha\*3\*t) + Gamma\_a4\*cos(alpha\*4\*t) + Gamma\_b4\*sin(alpha\*4\*t) + Gamma\_a5\*cos(alpha\*5\*t) + Gamma\_b5\*sin(alpha\*5\*t) |  |
| yr | M1 + A1\*sin(alpha\*t) |  |

* + 1. Component Couplings

#### Average 1

|  |  |
| --- | --- |
| Coupling type | Average |
| Operator name | C |

Source selection

|  |  |
| --- | --- |
| Geometric entity level | Boundary |
| Selection | Boundary 4 |

* + 1. Coordinate Systems

#### Boundary System 1

|  |  |
| --- | --- |
| Coordinate system type | Boundary system |
| Tag | sys1 |

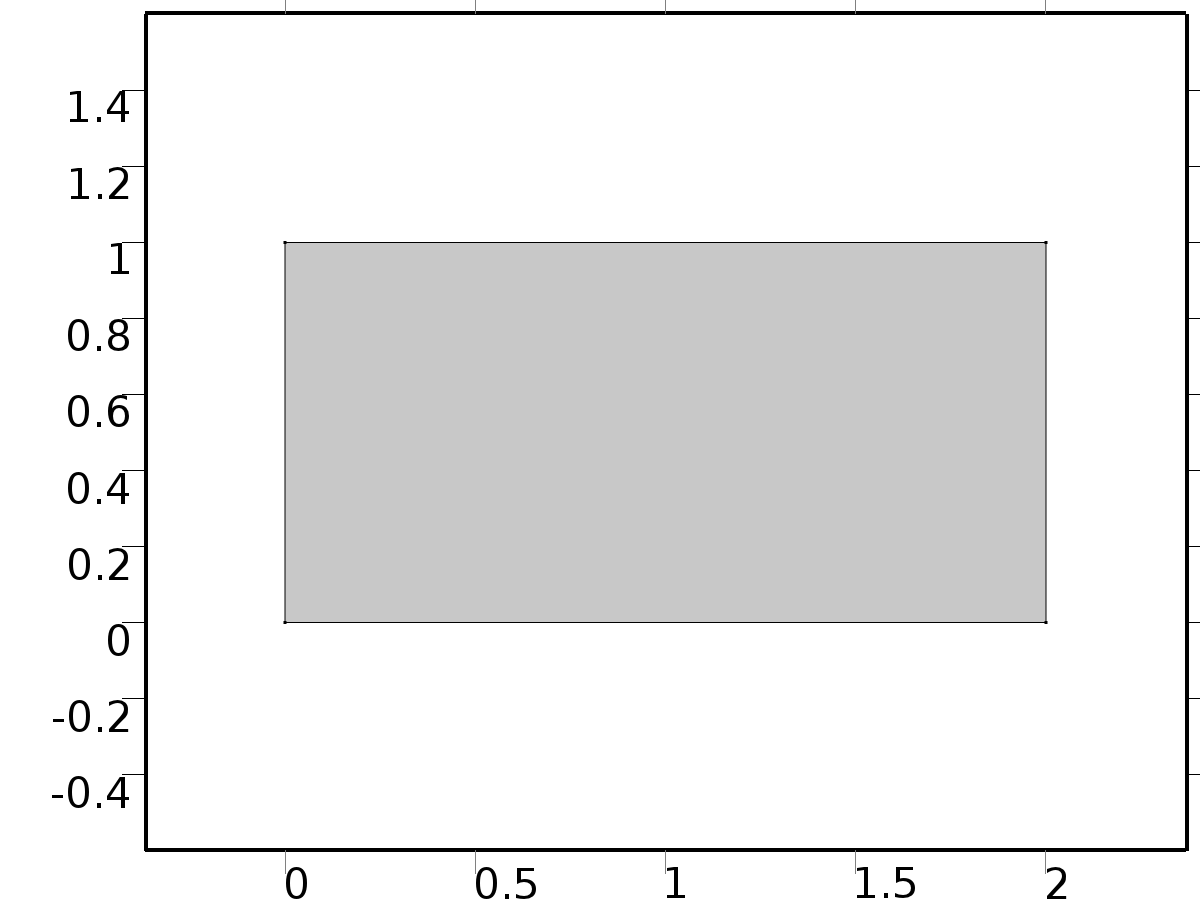
Coordinate names

| **First (t1)** | **Second (n)** | **Third (to)** |
| --- | --- | --- |
| t1 | n | to |

Settings

| **Description** | **Value** |
| --- | --- |
| Create first tangent direction from | Global Cartesian |

* 1. Geometry 1



Geometry 1

Units

|  |  |
| --- | --- |
| Length unit | m |
| Angular unit | deg |

Geometry statistics

| **Description** | **Value** |
| --- | --- |
| Space dimension | 2 |
| Number of domains | 1 |
| Number of boundaries | 4 |
| Number of vertices | 4 |

* + 1. Rectangle 1 (r1)

Position

| **Description** | **Value** |
| --- | --- |
| Position | {0, 0} |
| Layers |  |

Size

| **Description** | **Value** |
| --- | --- |
| Width | 2\*L |
| Height | L |

* 1. Unit Input



Unit Input

Selection

|  |  |
| --- | --- |
| Geometric entity level | Domain |
| Selection | Domain 1 |

Settings

| **Description** | **Value** |
| --- | --- |
| Shape function type | Lagrange |
| Element order | Quadratic |
| Compute boundary fluxes | On |
| Apply smoothing to boundary fluxes | On |
| Value type when using splitting of complex variables | Complex |
| Dependent variable quantity | Dimensionless (1) |
| Source term quantity | None |
| Unit | m^ - 2 |

Used products

|  |
| --- |
| COMSOL Multiphysics |

Variables

| **Name** | **Expression** | **Unit** | **Description** | **Selection** |
| --- | --- | --- | --- | --- |
| X.nx | dnx |  | Normal vector, x component | Boundaries 1–4 |
| X.ny | dny |  | Normal vector, y component | Boundaries 1–4 |
| X.nz | 0 |  | Normal vector, z component | Boundaries 1–4 |
| X.nxmesh | root.dnxmesh |  | Normal vector (mesh), x component | Boundaries 1–4 |
| X.nymesh | root.dnymesh |  | Normal vector (mesh), y component | Boundaries 1–4 |
| X.nzmesh | 0 |  | Normal vector (mesh), z component | Boundaries 1–4 |

* + 1. Coefficient Form PDE 1



Coefficient Form PDE 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Domain |
| Selection | Domain 1 |

Equations







Settings

| **Description** | **Value** |
| --- | --- |
| Diffusion coefficient | {{{{nu, 0}, {0, nu}}, {{0, 0}, {0, 0}}}, {{{0, 0}, {0, 0}}, {{nu, 0}, {0, nu}}}} |
| Absorption coefficient | {{0, 0}, {0, 0}} |
| Source term | {0, 0} |
| Mass coefficient | {{0, 0}, {0, 0}} |
| Damping or mass coefficient | {{0, 0}, {0, 0}} |
| Conservative flux convection coefficient | {{{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}} |
| Convection coefficient | {{{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}} |
| Conservative flux source | {{0, 0}, {0, 0}} |

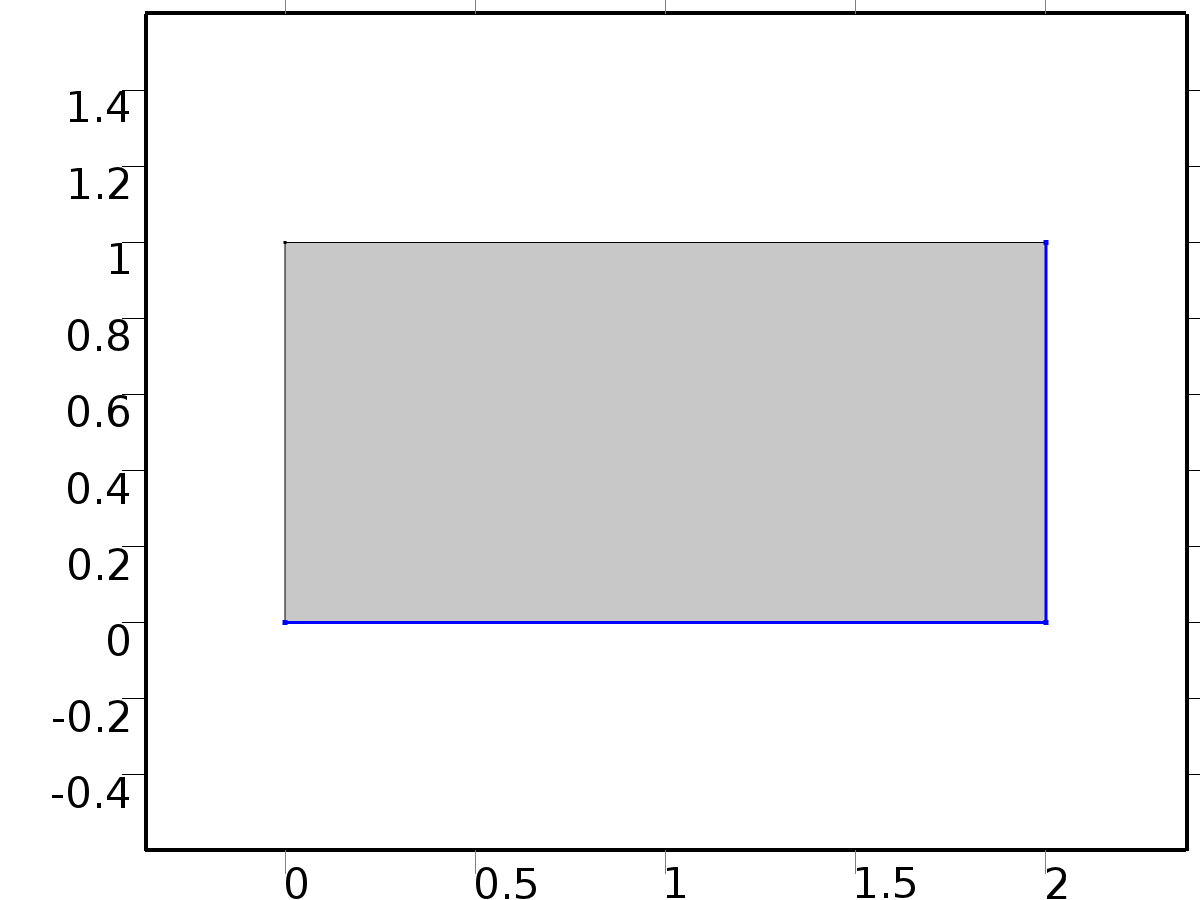
#### Variables

| **Name** | **Expression** | **Unit** | **Description** | **Selection** |
| --- | --- | --- | --- | --- |
| domflux.Xux | -nu\*d(Xu,x) |  | Domain flux, x component | Domain 1 |
| domflux.Xuy | -nu\*d(Xu,y) |  | Domain flux, y component | Domain 1 |
| domflux.Xvx | -nu\*d(Xv,x) |  | Domain flux, x component | Domain 1 |
| domflux.Xvy | -nu\*d(Xv,y) |  | Domain flux, y component | Domain 1 |

#### Shape functions

| **Name** | **Shape function** | **Unit** | **Description** | **Shape frame** | **Selection** |
| --- | --- | --- | --- | --- | --- |
| Xu | Lagrange (Quadratic) |  | Dependent variable Xu | Material | Domain 1 |
| Xv | Lagrange (Quadratic) |  | Dependent variable Xv | Material | Domain 1 |

* + 1. Zero Flux 1



Zero Flux 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Boundary |
| Selection | Boundaries 2, 4 |

Equations







* + 1. Initial Values 1



Initial Values 1

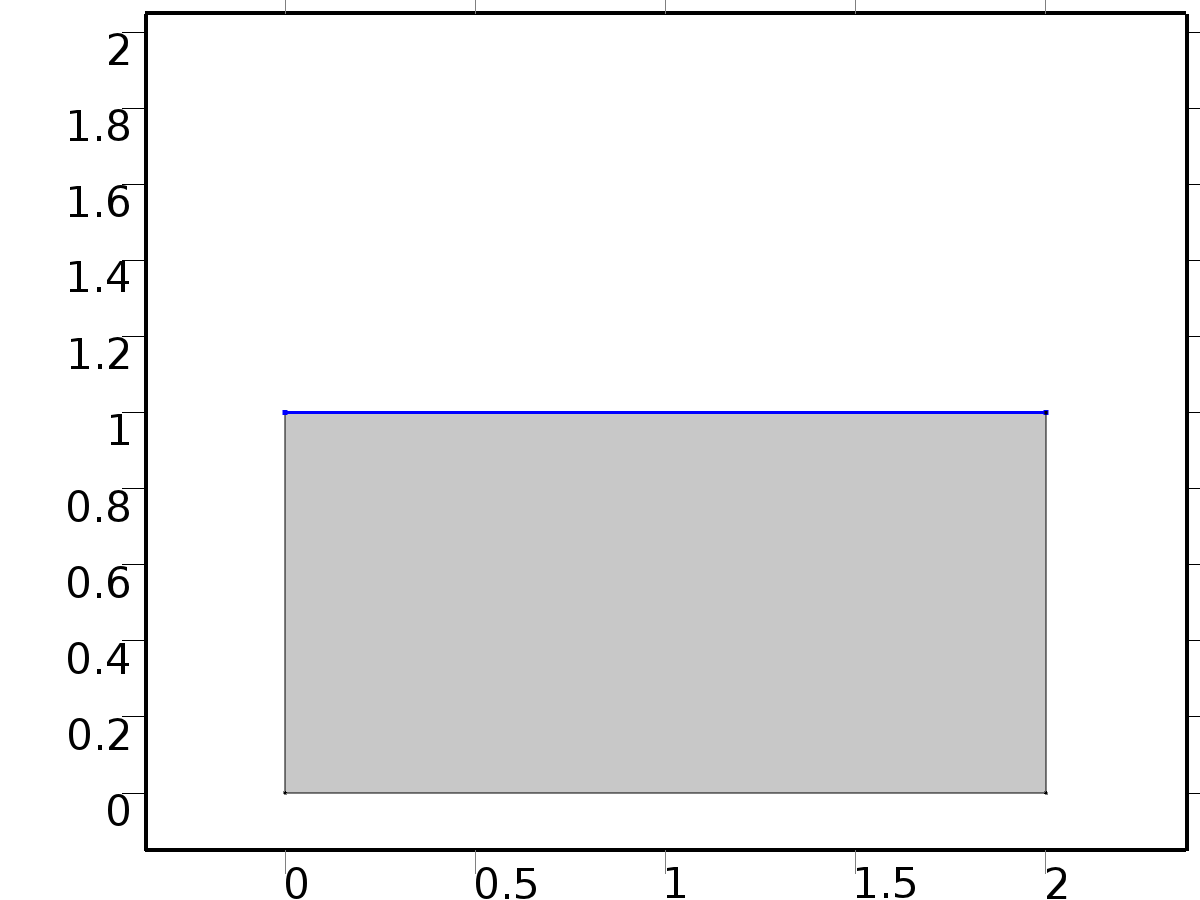
Selection

|  |  |
| --- | --- |
| Geometric entity level | Domain |
| Selection | Domain 1 |

Settings

| **Description** | **Value** |
| --- | --- |
| Initial value for Xu | 0 |
| Initial value for Xv | 0 |
| Initial time derivative of Xu | 0 |
| Initial time derivative of Xv | 0 |

* + 1. Dirichlet Boundary Condition 1



Dirichlet Boundary Condition 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Boundary |
| Selection | Boundary 3 |

Equations









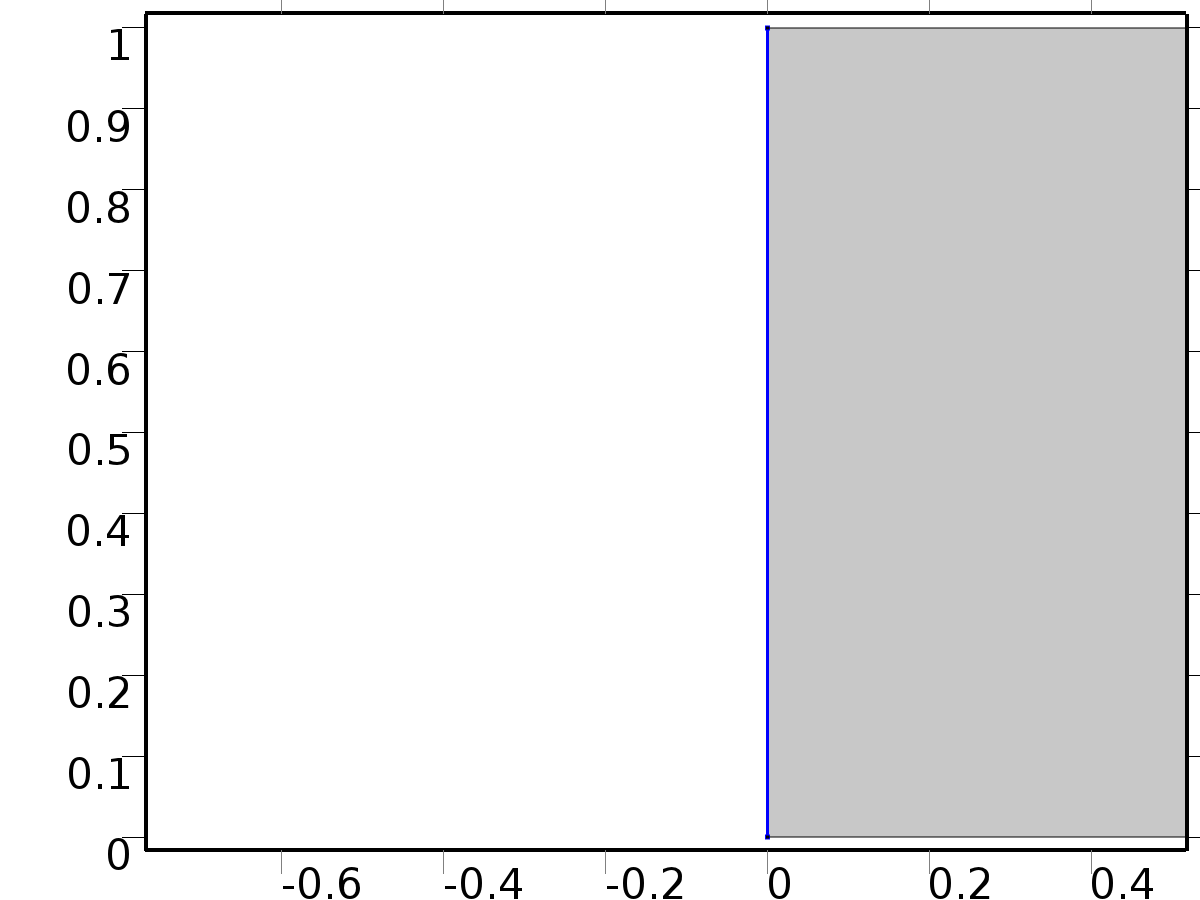
Settings

| **Description** | **Value** |
| --- | --- |
| Value on boundary | {0, 0} |
| Prescribed value of Xu | On |
| Prescribed value of Xv | On |
| Apply reaction terms on | Individual dependent variables |
| Use weak constraints | Off |
| Constraint method | Elemental |

#### Shape functions

| **Constraint** | **Constraint force** | **Shape function** | **Selection** |
| --- | --- | --- | --- |
| -Xu | -test(Xu) | Lagrange (Quadratic) | Boundary 3 |
| -Xv | -test(Xv) | Lagrange (Quadratic) | Boundary 3 |

* + 1. Flux/Source 1



Flux/Source 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Boundary |
| Selection | Boundary 1 |

Equations







Settings

| **Description** | **Value** |
| --- | --- |
| Boundary flux/source | {1, 0} |
| Boundary absorption/impedance term | {{K, 0}, {0, K}} |

#### Variables

| **Name** | **Expression** | **Unit** | **Description** | **Selection** |
| --- | --- | --- | --- | --- |
| X.g\_Xu | 1-K\*Xu |  | Boundary flux/source | Boundary 1 |
| X.g\_Xv | -K\*Xv |  | Boundary flux/source | Boundary 1 |

* 1. Fourier coefficients 0



Fourier coefficients 0

Selection

|  |  |
| --- | --- |
| Geometric entity level | Domain |
| Selection | Domain 1 |

Settings

| **Description** | **Value** |
| --- | --- |
| Shape function type | Lagrange |
| Element order | Quadratic |
| Compute boundary fluxes | On |
| Apply smoothing to boundary fluxes | On |
| Value type when using splitting of complex variables | Complex |
| Dependent variable quantity | Dimensionless (1) |
| Source term quantity | None |
| Unit | m^ - 2 |

Used products

|  |
| --- |
| COMSOL Multiphysics |

Variables

| **Name** | **Expression** | **Unit** | **Description** | **Selection** |
| --- | --- | --- | --- | --- |
| A0.nx | dnx |  | Normal vector, x component | Boundaries 1–4 |
| A0.ny | dny |  | Normal vector, y component | Boundaries 1–4 |
| A0.nz | 0 |  | Normal vector, z component | Boundaries 1–4 |
| A0.nxmesh | root.dnxmesh |  | Normal vector (mesh), x component | Boundaries 1–4 |
| A0.nymesh | root.dnymesh |  | Normal vector (mesh), y component | Boundaries 1–4 |
| A0.nzmesh | 0 |  | Normal vector (mesh), z component | Boundaries 1–4 |

* + 1. Coefficient Form PDE 1



Coefficient Form PDE 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Domain |
| Selection | Domain 1 |

Equations







Settings

| **Description** | **Value** |
| --- | --- |
| Diffusion coefficient | {{{{nu, 0}, {0, nu}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}}, {{{0, 0}, {0, 0}}, {{nu, 0}, {0, nu}}, {{0, 0}, {0, 0}}}, {{{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{nu, 0}, {0, nu}}}} |
| Absorption coefficient | {{0, 0, 0}, {0, 0, 0}, {0, 0, 0}} |
| Source term | {f\_au0, f\_av0, f\_au0} |
| Mass coefficient | {{0, 0, 0}, {0, 0, 0}, {0, 0, 0}} |
| Damping or mass coefficient | {{0, 0, 0}, {0, 0, 0}, {0, 0, 0}} |
| Conservative flux convection coefficient | {{{0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}}} |
| Convection coefficient | {{{0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}}} |
| Conservative flux source | {{0, 0}, {0, 0}, {0, 0}} |

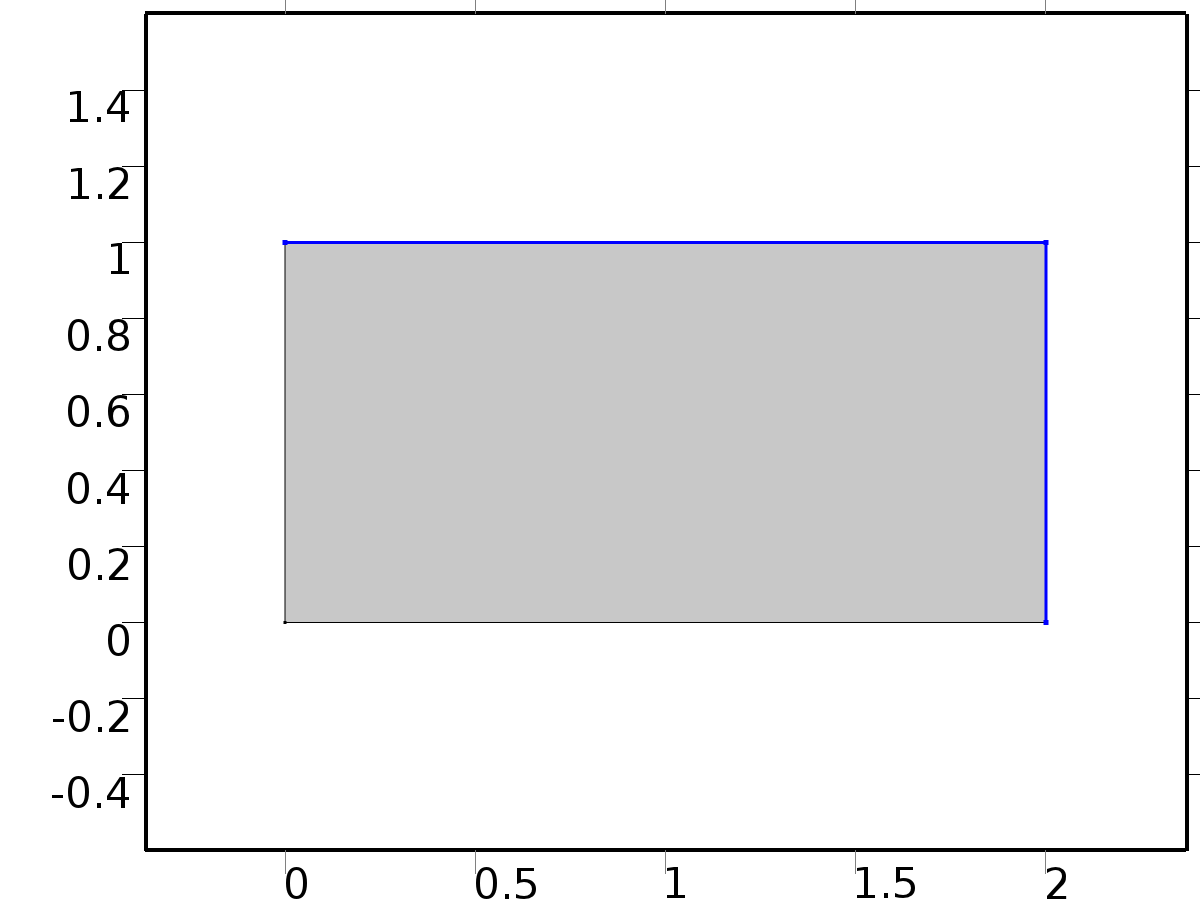
#### Variables

| **Name** | **Expression** | **Unit** | **Description** | **Selection** |
| --- | --- | --- | --- | --- |
| domflux.au0x | -nu\*d(au0,x) |  | Domain flux, x component | Domain 1 |
| domflux.au0y | -nu\*d(au0,y) |  | Domain flux, y component | Domain 1 |
| domflux.av0x | -nu\*d(av0,x) |  | Domain flux, x component | Domain 1 |
| domflux.av0y | -nu\*d(av0,y) |  | Domain flux, y component | Domain 1 |
| domflux.atu0x | -nu\*d(atu0,x) |  | Domain flux, x component | Domain 1 |
| domflux.atu0y | -nu\*d(atu0,y) |  | Domain flux, y component | Domain 1 |

#### Shape functions

| **Name** | **Shape function** | **Unit** | **Description** | **Shape frame** | **Selection** |
| --- | --- | --- | --- | --- | --- |
| au0 | Lagrange (Quadratic) |  | Dependent variable au0 | Material | Domain 1 |
| av0 | Lagrange (Quadratic) |  | Dependent variable av0 | Material | Domain 1 |
| atu0 | Lagrange (Quadratic) |  | Dependent variable atu0 | Material | Domain 1 |

* + 1. Zero Flux 1



Zero Flux 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Boundary |
| Selection | Boundaries 3–4 |

Equations







* + 1. Initial Values 1



Initial Values 1

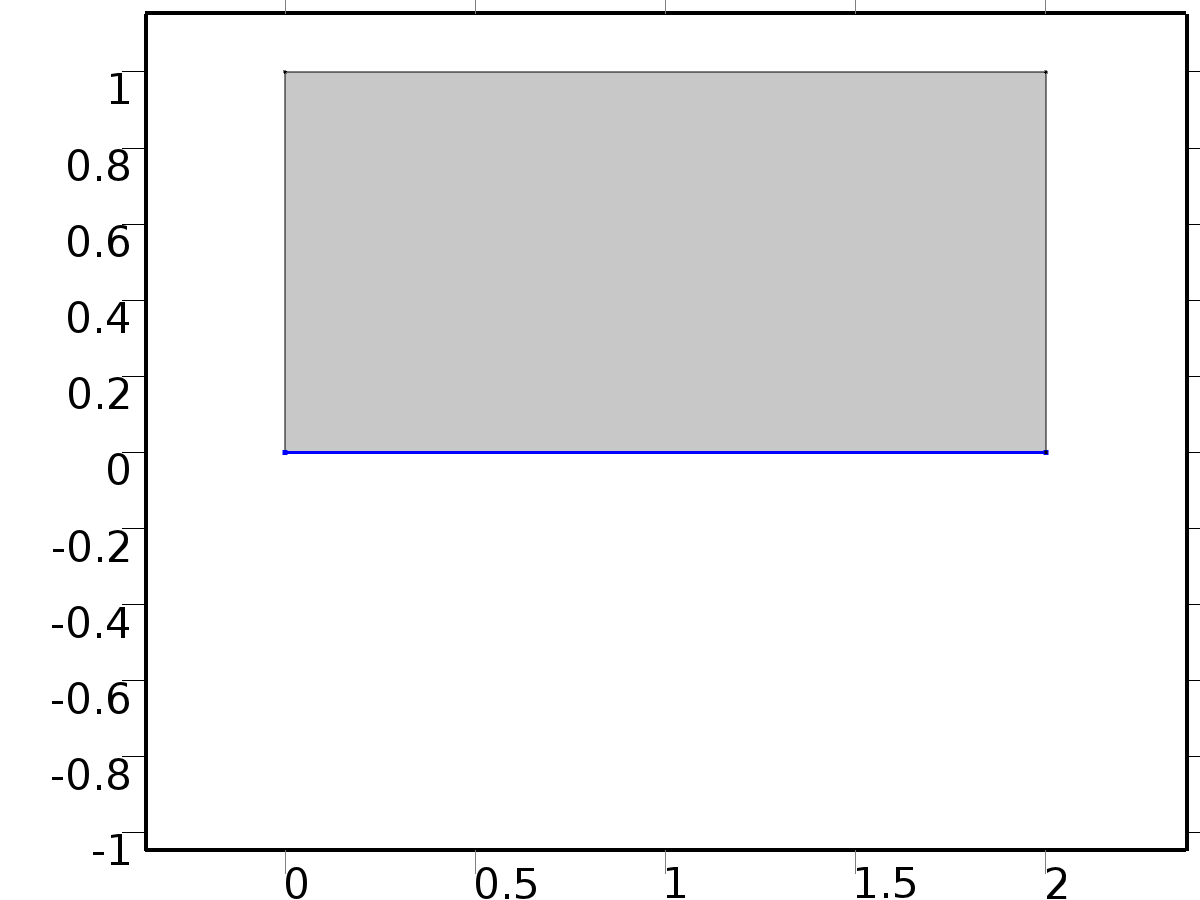
Selection

|  |  |
| --- | --- |
| Geometric entity level | Domain |
| Selection | Domain 1 |

Settings

| **Description** | **Value** |
| --- | --- |
| Initial value for au0 | 0 |
| Initial value for av0 | 0 |
| Initial value for atu0 | 0 |
| Initial time derivative of au0 | 0 |
| Initial time derivative of av0 | 0 |
| Initial time derivative of atu0 | 0 |

* + 1. Dirichlet Boundary Condition 1



Dirichlet Boundary Condition 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Boundary |
| Selection | Boundary 2 |

Equations









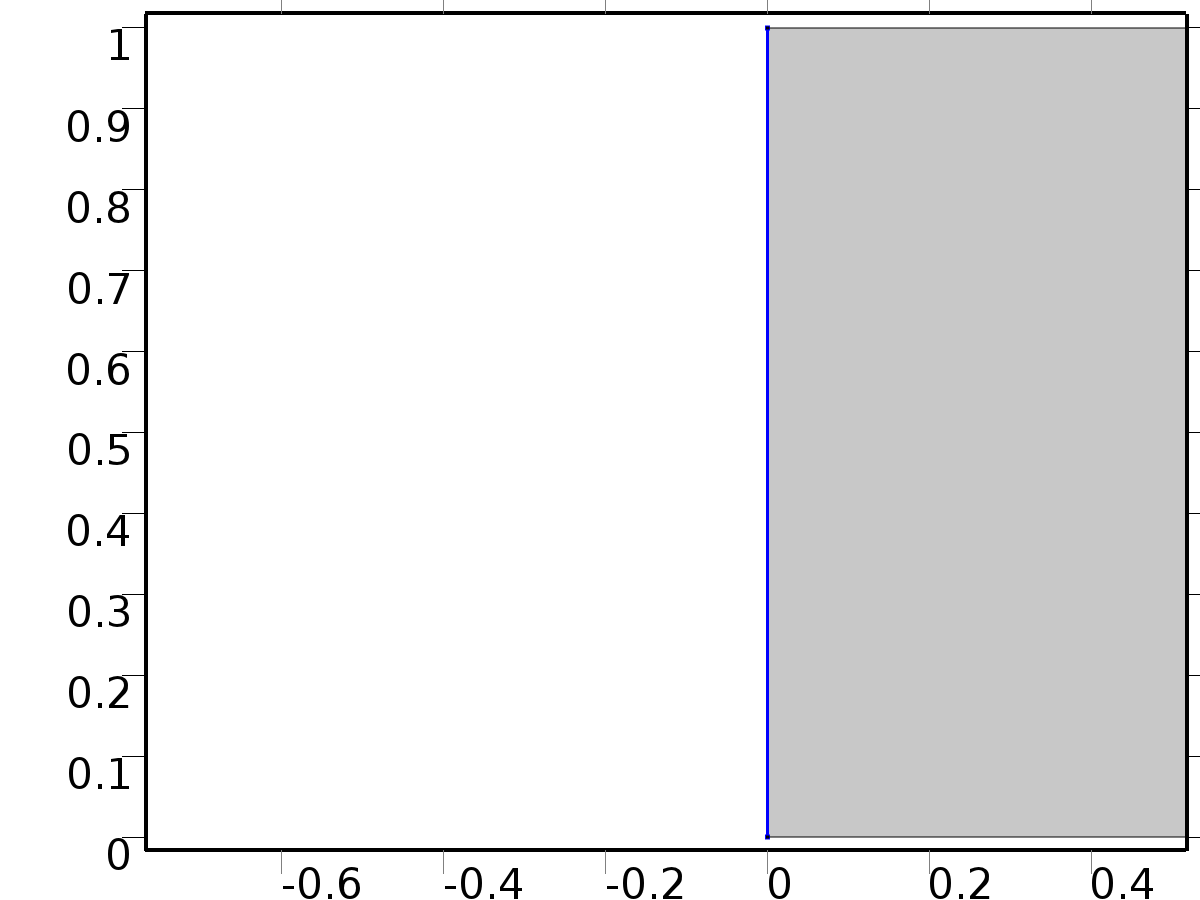
Settings

| **Description** | **Value** |
| --- | --- |
| Value on boundary | {0, d\_a0, 0} |
| Prescribed value of au0 | On |
| Prescribed value of av0 | On |
| Prescribed value of atu0 | On |
| Apply reaction terms on | Individual dependent variables |
| Use weak constraints | Off |
| Constraint method | Elemental |

#### Shape functions

| **Constraint** | **Constraint force** | **Shape function** | **Selection** |
| --- | --- | --- | --- |
| -au0 | -test(au0) | Lagrange (Quadratic) | Boundary 2 |
| d\_a0-av0 | -test(av0) | Lagrange (Quadratic) | Boundary 2 |
| -atu0 | -test(atu0) | Lagrange (Quadratic) | Boundary 2 |

* + 1. Flux/Source 1



Flux/Source 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Boundary |
| Selection | Boundary 1 |

Equations







Settings

| **Description** | **Value** |
| --- | --- |
| Boundary flux/source | {Gamma\_a0, 0, 0} |
| Boundary absorption/impedance term | {{K, 0, 0}, {0, K, 0}, {0, 0, K}} |

#### Variables

| **Name** | **Expression** | **Unit** | **Description** | **Selection** |
| --- | --- | --- | --- | --- |
| A0.g\_au0 | Gamma\_a0-K\*au0 |  | Boundary flux/source | Boundary 1 |
| A0.g\_av0 | -K\*av0 |  | Boundary flux/source | Boundary 1 |
| A0.g\_atu0 | -K\*atu0 |  | Boundary flux/source | Boundary 1 |

* 1. Fourier coefficients 1



Fourier coefficients 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Domain |
| Selection | Domain 1 |

Settings

| **Description** | **Value** |
| --- | --- |
| Shape function type | Lagrange |
| Element order | Quadratic |
| Compute boundary fluxes | On |
| Apply smoothing to boundary fluxes | On |
| Value type when using splitting of complex variables | Complex |
| Dependent variable quantity | Dimensionless (1) |
| Source term quantity | None |
| Unit | m^ - 2 |

Used products

|  |
| --- |
| COMSOL Multiphysics |

Variables

| **Name** | **Expression** | **Unit** | **Description** | **Selection** |
| --- | --- | --- | --- | --- |
| A1.nx | dnx |  | Normal vector, x component | Boundaries 1–4 |
| A1.ny | dny |  | Normal vector, y component | Boundaries 1–4 |
| A1.nz | 0 |  | Normal vector, z component | Boundaries 1–4 |
| A1.nxmesh | root.dnxmesh |  | Normal vector (mesh), x component | Boundaries 1–4 |
| A1.nymesh | root.dnymesh |  | Normal vector (mesh), y component | Boundaries 1–4 |
| A1.nzmesh | 0 |  | Normal vector (mesh), z component | Boundaries 1–4 |

* + 1. Coefficient Form PDE 1



Coefficient Form PDE 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Domain |
| Selection | Domain 1 |

Equations







Settings

| **Description** | **Value** |
| --- | --- |
| Diffusion coefficient | {{{{nu, 0}, {0, nu}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}}, {{{0, 0}, {0, 0}}, {{nu, 0}, {0, nu}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}}, {{{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{nu, 0}, {0, nu}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}}, {{{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{nu, 0}, {0, nu}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}}, {{{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{nu, 0}, {0, nu}}, {{0, 0}, {0, 0}}}, {{{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{nu, 0}, {0, nu}}}} |
| Absorption coefficient | {{0, -alpha, 0, 0, 0, -alpha}, {alpha, 0, 0, 0, alpha, 0}, {0, 0, 0, -alpha, 0, 0}, {0, 0, alpha, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}} |
| Source term | {f\_au1, f\_bu1, f\_av1, f\_bv1, f\_au1, f\_bu1} |
| Mass coefficient | {{0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}} |
| Damping or mass coefficient | {{0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}} |
| Conservative flux convection coefficient | {{{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}} |
| Convection coefficient | {{{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}} |
| Conservative flux source | {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}} |

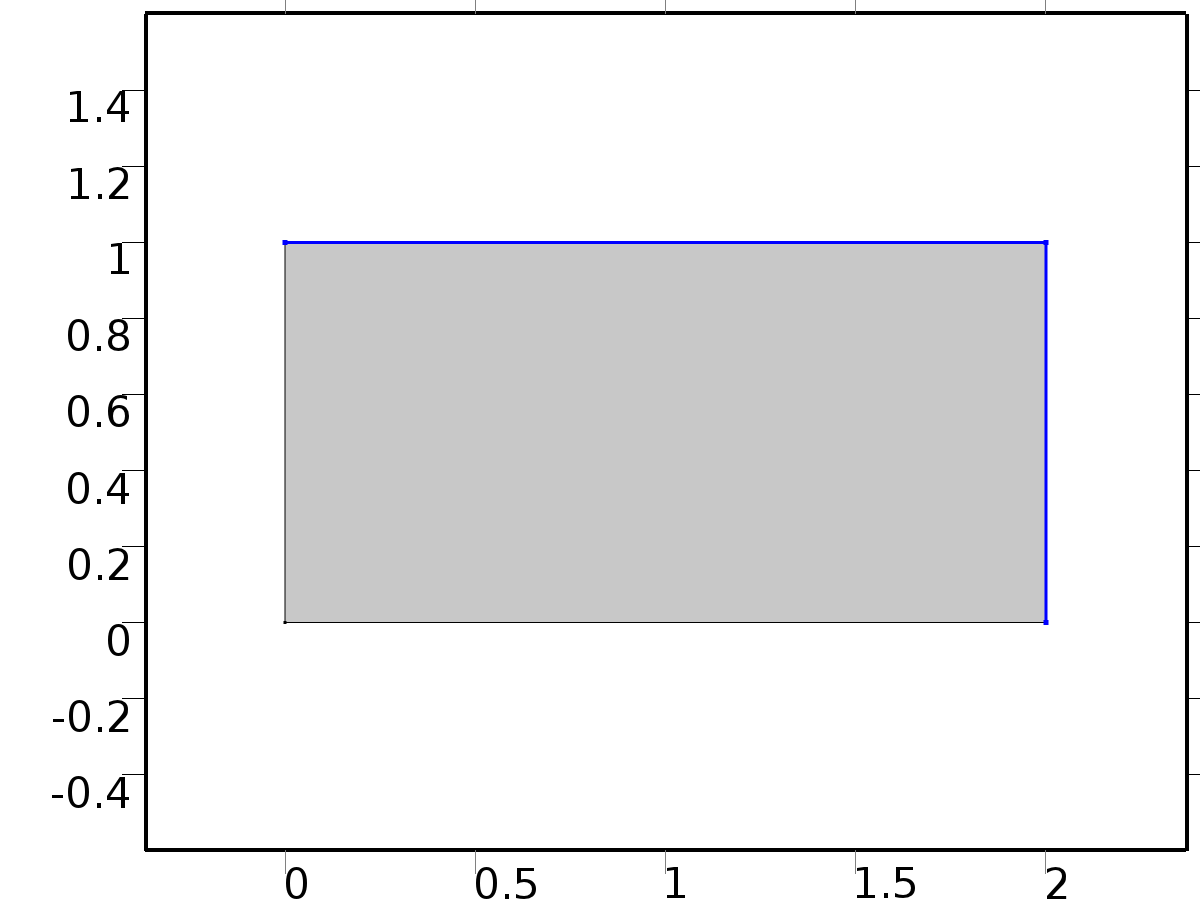
#### Variables

| **Name** | **Expression** | **Unit** | **Description** | **Selection** |
| --- | --- | --- | --- | --- |
| domflux.au1x | -nu\*d(au1,x) |  | Domain flux, x component | Domain 1 |
| domflux.au1y | -nu\*d(au1,y) |  | Domain flux, y component | Domain 1 |
| domflux.bu1x | -nu\*d(bu1,x) |  | Domain flux, x component | Domain 1 |
| domflux.bu1y | -nu\*d(bu1,y) |  | Domain flux, y component | Domain 1 |
| domflux.av1x | -nu\*d(av1,x) |  | Domain flux, x component | Domain 1 |
| domflux.av1y | -nu\*d(av1,y) |  | Domain flux, y component | Domain 1 |
| domflux.bv1x | -nu\*d(bv1,x) |  | Domain flux, x component | Domain 1 |
| domflux.bv1y | -nu\*d(bv1,y) |  | Domain flux, y component | Domain 1 |
| domflux.atu1x | -nu\*d(atu1,x) |  | Domain flux, x component | Domain 1 |
| domflux.atu1y | -nu\*d(atu1,y) |  | Domain flux, y component | Domain 1 |
| domflux.btu1x | -nu\*d(btu1,x) |  | Domain flux, x component | Domain 1 |
| domflux.btu1y | -nu\*d(btu1,y) |  | Domain flux, y component | Domain 1 |

#### Shape functions

| **Name** | **Shape function** | **Unit** | **Description** | **Shape frame** | **Selection** |
| --- | --- | --- | --- | --- | --- |
| au1 | Lagrange (Quadratic) |  | Dependent variable au1 | Material | Domain 1 |
| bu1 | Lagrange (Quadratic) |  | Dependent variable bu1 | Material | Domain 1 |
| av1 | Lagrange (Quadratic) |  | Dependent variable av1 | Material | Domain 1 |
| bv1 | Lagrange (Quadratic) |  | Dependent variable bv1 | Material | Domain 1 |
| atu1 | Lagrange (Quadratic) |  | Dependent variable atu1 | Material | Domain 1 |
| btu1 | Lagrange (Quadratic) |  | Dependent variable btu1 | Material | Domain 1 |

* + 1. Zero Flux 1



Zero Flux 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Boundary |
| Selection | Boundaries 3–4 |

Equations







* + 1. Initial Values 1



Initial Values 1

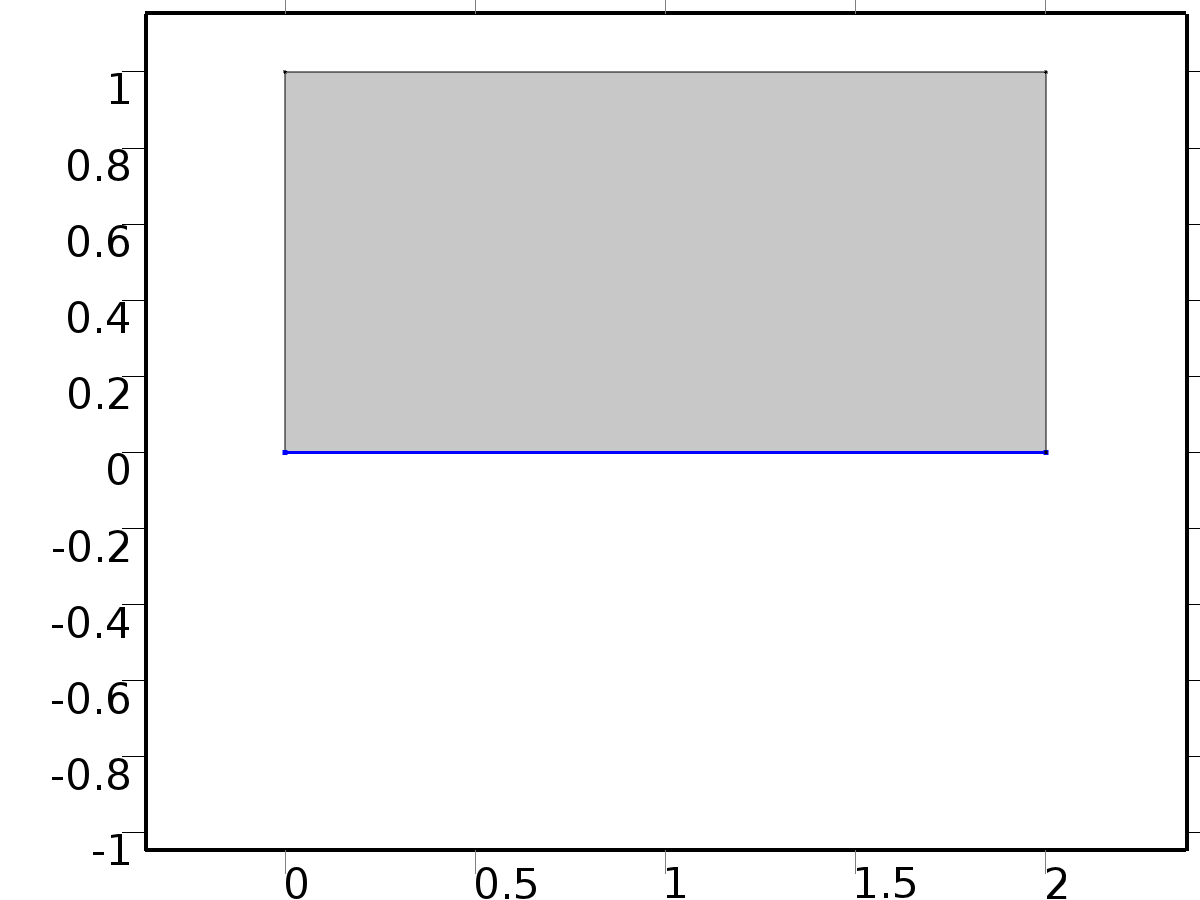
Selection

|  |  |
| --- | --- |
| Geometric entity level | Domain |
| Selection | Domain 1 |

Settings

| **Description** | **Value** |
| --- | --- |
| Initial value for au1 | 0 |
| Initial value for bu1 | 0 |
| Initial value for av1 | 0 |
| Initial value for bv1 | 0 |
| Initial value for atu1 | 0 |
| Initial value for btu1 | 0 |
| Initial time derivative of au1 | 0 |
| Initial time derivative of bu1 | 0 |
| Initial time derivative of av1 | 0 |
| Initial time derivative of bv1 | 0 |
| Initial time derivative of atu1 | 0 |
| Initial time derivative of btu1 | 0 |

* + 1. Dirichlet Boundary Condition 1



Dirichlet Boundary Condition 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Boundary |
| Selection | Boundary 2 |

Equations









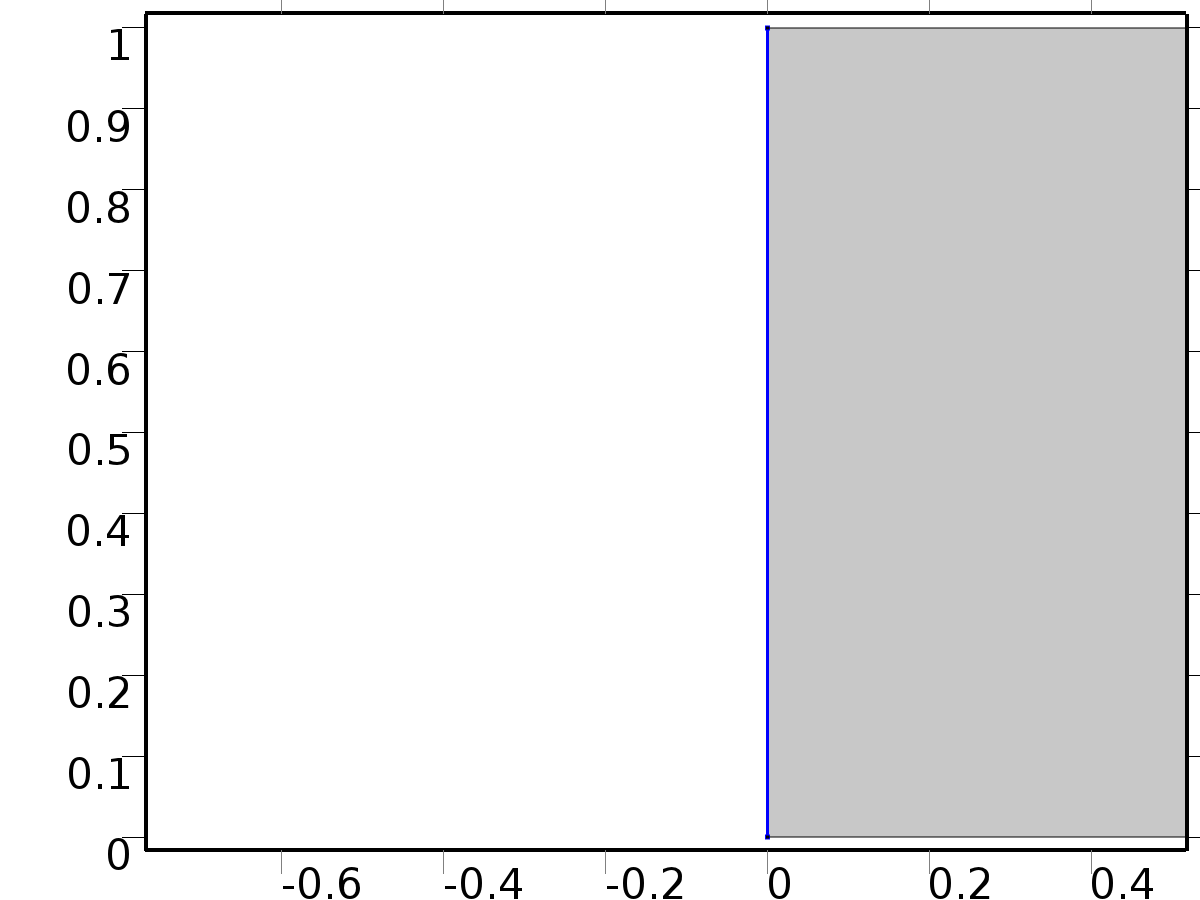
Settings

| **Description** | **Value** |
| --- | --- |
| Value on boundary | {0, 0, d\_a1, d\_b1, 0, 0} |
| Prescribed value of au1 | On |
| Prescribed value of bu1 | On |
| Prescribed value of av1 | On |
| Prescribed value of bv1 | On |
| Prescribed value of atu1 | On |
| Prescribed value of btu1 | On |
| Apply reaction terms on | Individual dependent variables |
| Use weak constraints | Off |
| Constraint method | Elemental |

#### Shape functions

| **Constraint** | **Constraint force** | **Shape function** | **Selection** |
| --- | --- | --- | --- |
| -au1 | -test(au1) | Lagrange (Quadratic) | Boundary 2 |
| -bu1 | -test(bu1) | Lagrange (Quadratic) | Boundary 2 |
| d\_a1-av1 | -test(av1) | Lagrange (Quadratic) | Boundary 2 |
| d\_b1-bv1 | -test(bv1) | Lagrange (Quadratic) | Boundary 2 |
| -atu1 | -test(atu1) | Lagrange (Quadratic) | Boundary 2 |
| -btu1 | -test(btu1) | Lagrange (Quadratic) | Boundary 2 |

* + 1. Flux/Source 1



Flux/Source 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Boundary |
| Selection | Boundary 1 |

Equations







Settings

| **Description** | **Value** |
| --- | --- |
| Boundary flux/source | {Gamma\_a1, Gamma\_b1, 0, 0, 0, 0} |
| Boundary absorption/impedance term | {{K, 0, 0, 0, 0, 0}, {0, K, 0, 0, 0, 0}, {0, 0, K, 0, 0, 0}, {0, 0, 0, K, 0, 0}, {0, 0, 0, 0, K, 0}, {0, 0, 0, 0, 0, K}} |

#### Variables

| **Name** | **Expression** | **Unit** | **Description** | **Selection** |
| --- | --- | --- | --- | --- |
| A1.g\_au1 | Gamma\_a1-K\*au1 |  | Boundary flux/source | Boundary 1 |
| A1.g\_bu1 | Gamma\_b1-K\*bu1 |  | Boundary flux/source | Boundary 1 |
| A1.g\_av1 | -K\*av1 |  | Boundary flux/source | Boundary 1 |
| A1.g\_bv1 | -K\*bv1 |  | Boundary flux/source | Boundary 1 |
| A1.g\_atu1 | -K\*atu1 |  | Boundary flux/source | Boundary 1 |
| A1.g\_btu1 | -K\*btu1 |  | Boundary flux/source | Boundary 1 |

* 1. Fourier coefficients 2



Fourier coefficients 2

Selection

|  |  |
| --- | --- |
| Geometric entity level | Domain |
| Selection | Domain 1 |

Settings

| **Description** | **Value** |
| --- | --- |
| Shape function type | Lagrange |
| Element order | Quadratic |
| Compute boundary fluxes | On |
| Apply smoothing to boundary fluxes | On |
| Value type when using splitting of complex variables | Complex |
| Dependent variable quantity | Dimensionless (1) |
| Source term quantity | None |
| Unit | m^ - 2 |

Used products

|  |
| --- |
| COMSOL Multiphysics |

Variables

| **Name** | **Expression** | **Unit** | **Description** | **Selection** |
| --- | --- | --- | --- | --- |
| A2.nx | dnx |  | Normal vector, x component | Boundaries 1–4 |
| A2.ny | dny |  | Normal vector, y component | Boundaries 1–4 |
| A2.nz | 0 |  | Normal vector, z component | Boundaries 1–4 |
| A2.nxmesh | root.dnxmesh |  | Normal vector (mesh), x component | Boundaries 1–4 |
| A2.nymesh | root.dnymesh |  | Normal vector (mesh), y component | Boundaries 1–4 |
| A2.nzmesh | 0 |  | Normal vector (mesh), z component | Boundaries 1–4 |

* + 1. Coefficient Form PDE 1



Coefficient Form PDE 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Domain |
| Selection | Domain 1 |

Equations







Settings

| **Description** | **Value** |
| --- | --- |
| Diffusion coefficient | {{{{nu, 0}, {0, nu}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}}, {{{0, 0}, {0, 0}}, {{nu, 0}, {0, nu}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}}, {{{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{nu, 0}, {0, nu}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}}, {{{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{nu, 0}, {0, nu}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}}, {{{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{nu, 0}, {0, nu}}, {{0, 0}, {0, 0}}}, {{{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{nu, 0}, {0, nu}}}} |
| Absorption coefficient | {{0, -2\*alpha, 0, 0, 0, -2\*alpha}, {2\*alpha, 0, 0, 0, 2\*alpha, 0}, {0, 0, 0, -2\*alpha, 0, 0}, {0, 0, 2\*alpha, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}} |
| Source term | {f\_au2, f\_bu2, f\_av2, f\_bv2, f\_au2, f\_bu2} |
| Mass coefficient | {{0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}} |
| Damping or mass coefficient | {{0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}} |
| Conservative flux convection coefficient | {{{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}} |
| Convection coefficient | {{{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}} |
| Conservative flux source | {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}} |

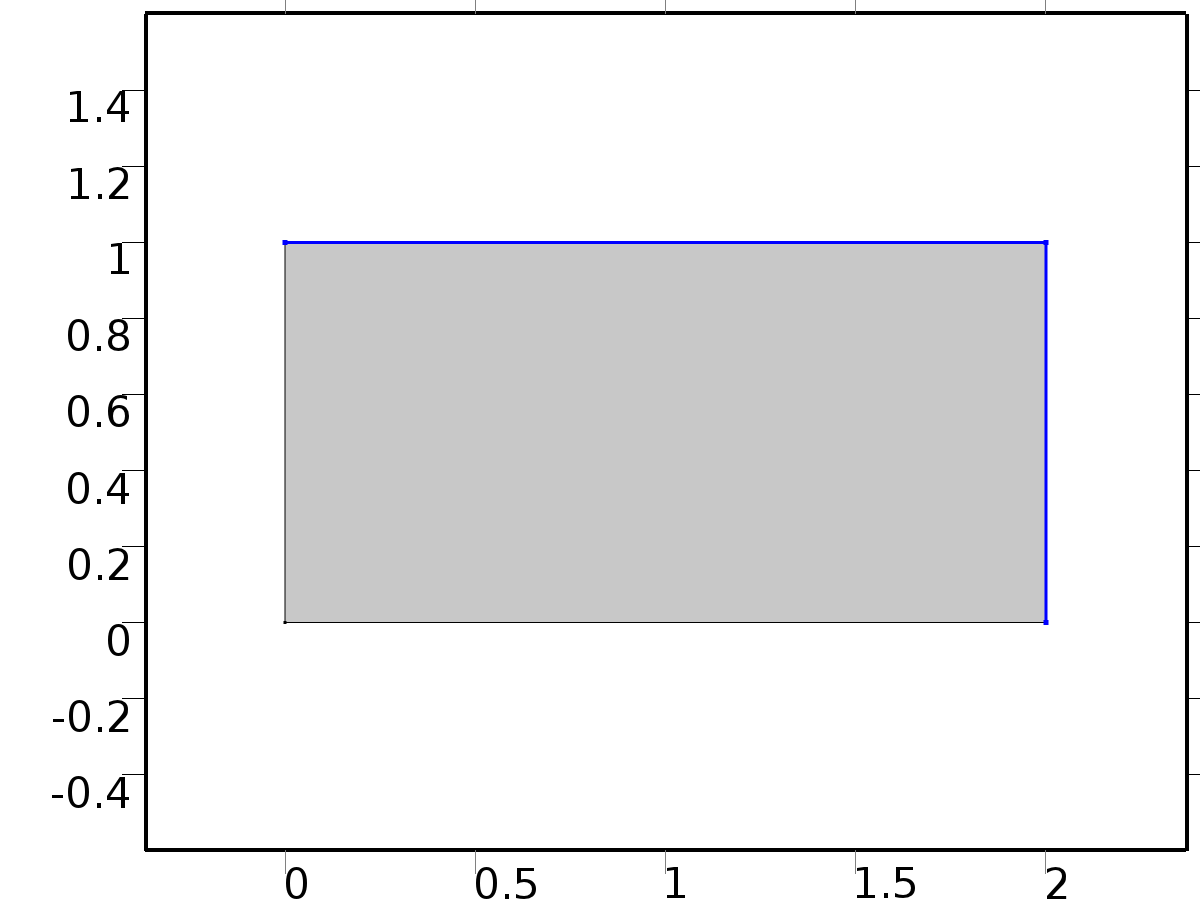
#### Variables

| **Name** | **Expression** | **Unit** | **Description** | **Selection** |
| --- | --- | --- | --- | --- |
| domflux.au2x | -nu\*d(au2,x) |  | Domain flux, x component | Domain 1 |
| domflux.au2y | -nu\*d(au2,y) |  | Domain flux, y component | Domain 1 |
| domflux.bu2x | -nu\*d(bu2,x) |  | Domain flux, x component | Domain 1 |
| domflux.bu2y | -nu\*d(bu2,y) |  | Domain flux, y component | Domain 1 |
| domflux.av2x | -nu\*d(av2,x) |  | Domain flux, x component | Domain 1 |
| domflux.av2y | -nu\*d(av2,y) |  | Domain flux, y component | Domain 1 |
| domflux.bv2x | -nu\*d(bv2,x) |  | Domain flux, x component | Domain 1 |
| domflux.bv2y | -nu\*d(bv2,y) |  | Domain flux, y component | Domain 1 |
| domflux.atu2x | -nu\*d(atu2,x) |  | Domain flux, x component | Domain 1 |
| domflux.atu2y | -nu\*d(atu2,y) |  | Domain flux, y component | Domain 1 |
| domflux.btu2x | -nu\*d(btu2,x) |  | Domain flux, x component | Domain 1 |
| domflux.btu2y | -nu\*d(btu2,y) |  | Domain flux, y component | Domain 1 |

#### Shape functions

| **Name** | **Shape function** | **Unit** | **Description** | **Shape frame** | **Selection** |
| --- | --- | --- | --- | --- | --- |
| au2 | Lagrange (Quadratic) |  | Dependent variable au2 | Material | Domain 1 |
| bu2 | Lagrange (Quadratic) |  | Dependent variable bu2 | Material | Domain 1 |
| av2 | Lagrange (Quadratic) |  | Dependent variable av2 | Material | Domain 1 |
| bv2 | Lagrange (Quadratic) |  | Dependent variable bv2 | Material | Domain 1 |
| atu2 | Lagrange (Quadratic) |  | Dependent variable atu2 | Material | Domain 1 |
| btu2 | Lagrange (Quadratic) |  | Dependent variable btu2 | Material | Domain 1 |

* + 1. Zero Flux 1



Zero Flux 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Boundary |
| Selection | Boundaries 3–4 |

Equations







* + 1. Initial Values 1



Initial Values 1

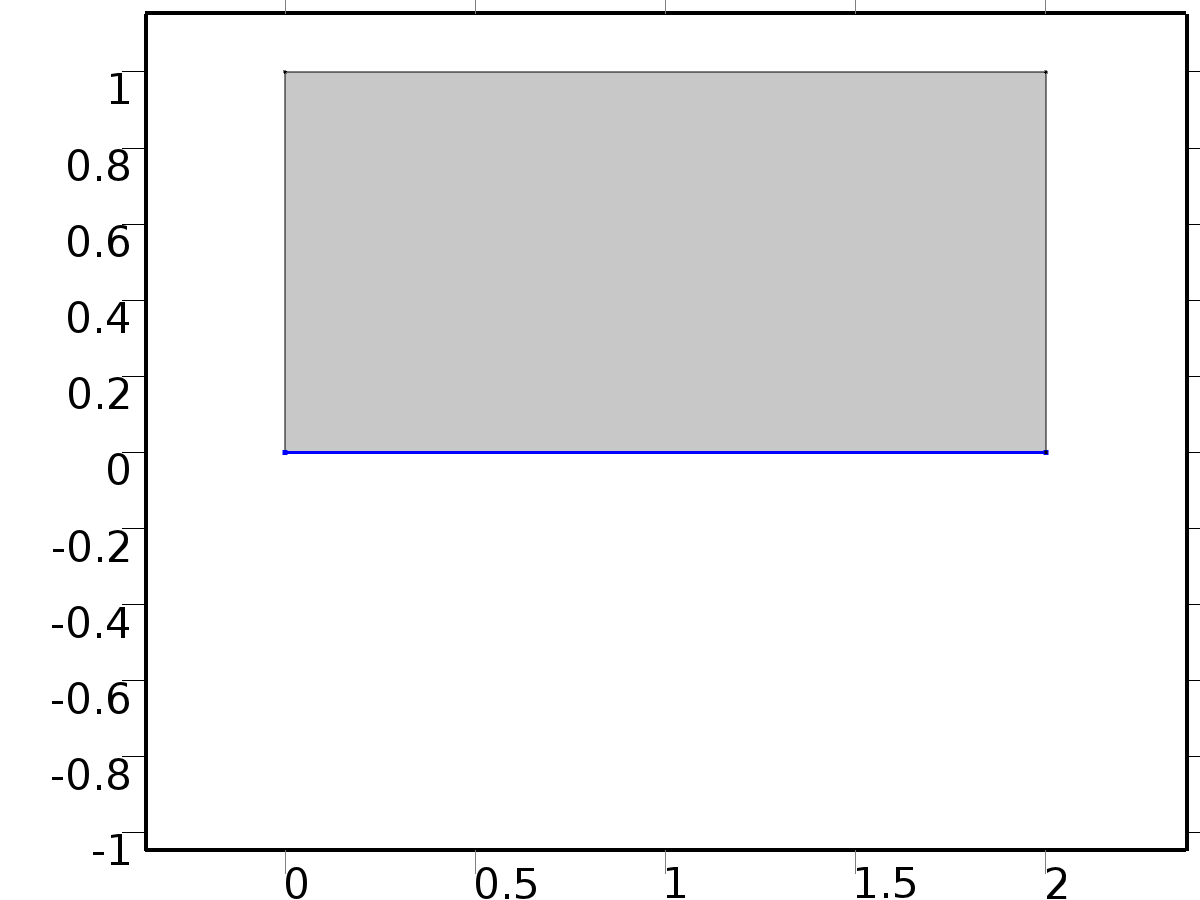
Selection

|  |  |
| --- | --- |
| Geometric entity level | Domain |
| Selection | Domain 1 |

Settings

| **Description** | **Value** |
| --- | --- |
| Initial value for au2 | 0 |
| Initial value for bu2 | 0 |
| Initial value for av2 | 0 |
| Initial value for bv2 | 0 |
| Initial value for atu2 | 0 |
| Initial value for btu2 | 0 |
| Initial time derivative of au2 | 0 |
| Initial time derivative of bu2 | 0 |
| Initial time derivative of av2 | 0 |
| Initial time derivative of bv2 | 0 |
| Initial time derivative of atu2 | 0 |
| Initial time derivative of btu2 | 0 |

* + 1. Dirichlet Boundary Condition 1



Dirichlet Boundary Condition 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Boundary |
| Selection | Boundary 2 |

Equations









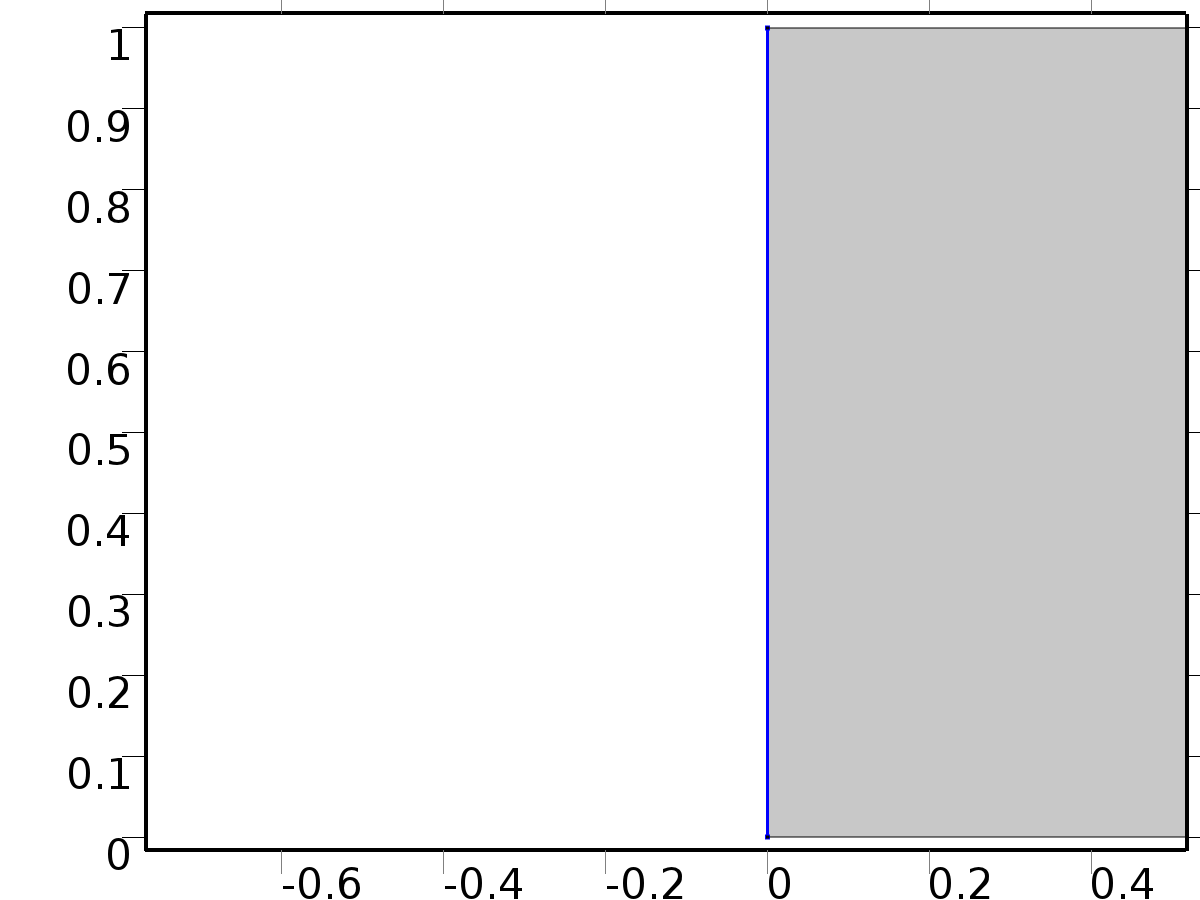
Settings

| **Description** | **Value** |
| --- | --- |
| Value on boundary | {0, 0, d\_a2, d\_b2, 0, 0} |
| Prescribed value of au2 | On |
| Prescribed value of bu2 | On |
| Prescribed value of av2 | On |
| Prescribed value of bv2 | On |
| Prescribed value of atu2 | On |
| Prescribed value of btu2 | On |
| Apply reaction terms on | Individual dependent variables |
| Use weak constraints | Off |
| Constraint method | Elemental |

#### Shape functions

| **Constraint** | **Constraint force** | **Shape function** | **Selection** |
| --- | --- | --- | --- |
| -au2 | -test(au2) | Lagrange (Quadratic) | Boundary 2 |
| -bu2 | -test(bu2) | Lagrange (Quadratic) | Boundary 2 |
| d\_a2-av2 | -test(av2) | Lagrange (Quadratic) | Boundary 2 |
| d\_b2-bv2 | -test(bv2) | Lagrange (Quadratic) | Boundary 2 |
| -atu2 | -test(atu2) | Lagrange (Quadratic) | Boundary 2 |
| -btu2 | -test(btu2) | Lagrange (Quadratic) | Boundary 2 |

* + 1. Flux/Source 1



Flux/Source 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Boundary |
| Selection | Boundary 1 |

Equations







Settings

| **Description** | **Value** |
| --- | --- |
| Boundary flux/source | {Gamma\_a2, Gamma\_b2, 0, 0, 0, 0} |
| Boundary absorption/impedance term | {{K, 0, 0, 0, 0, 0}, {0, K, 0, 0, 0, 0}, {0, 0, K, 0, 0, 0}, {0, 0, 0, K, 0, 0}, {0, 0, 0, 0, K, 0}, {0, 0, 0, 0, 0, K}} |

#### Variables

| **Name** | **Expression** | **Unit** | **Description** | **Selection** |
| --- | --- | --- | --- | --- |
| A2.g\_au2 | Gamma\_a2-K\*au2 |  | Boundary flux/source | Boundary 1 |
| A2.g\_bu2 | Gamma\_b2-K\*bu2 |  | Boundary flux/source | Boundary 1 |
| A2.g\_av2 | -K\*av2 |  | Boundary flux/source | Boundary 1 |
| A2.g\_bv2 | -K\*bv2 |  | Boundary flux/source | Boundary 1 |
| A2.g\_atu2 | -K\*atu2 |  | Boundary flux/source | Boundary 1 |
| A2.g\_btu2 | -K\*btu2 |  | Boundary flux/source | Boundary 1 |

* 1. Fourier coefficients 3



Fourier coefficients 3

Selection

|  |  |
| --- | --- |
| Geometric entity level | Domain |
| Selection | Domain 1 |

Settings

| **Description** | **Value** |
| --- | --- |
| Shape function type | Lagrange |
| Element order | Quadratic |
| Compute boundary fluxes | On |
| Apply smoothing to boundary fluxes | On |
| Value type when using splitting of complex variables | Complex |
| Dependent variable quantity | Dimensionless (1) |
| Source term quantity | None |
| Unit | m^ - 2 |

Used products

|  |
| --- |
| COMSOL Multiphysics |

Variables

| **Name** | **Expression** | **Unit** | **Description** | **Selection** |
| --- | --- | --- | --- | --- |
| A3.nx | dnx |  | Normal vector, x component | Boundaries 1–4 |
| A3.ny | dny |  | Normal vector, y component | Boundaries 1–4 |
| A3.nz | 0 |  | Normal vector, z component | Boundaries 1–4 |
| A3.nxmesh | root.dnxmesh |  | Normal vector (mesh), x component | Boundaries 1–4 |
| A3.nymesh | root.dnymesh |  | Normal vector (mesh), y component | Boundaries 1–4 |
| A3.nzmesh | 0 |  | Normal vector (mesh), z component | Boundaries 1–4 |

* + 1. Coefficient Form PDE 1



Coefficient Form PDE 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Domain |
| Selection | Domain 1 |

Equations







Settings

| **Description** | **Value** |
| --- | --- |
| Diffusion coefficient | {{{{nu, 0}, {0, nu}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}}, {{{0, 0}, {0, 0}}, {{nu, 0}, {0, nu}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}}, {{{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{nu, 0}, {0, nu}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}}, {{{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{nu, 0}, {0, nu}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}}, {{{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{nu, 0}, {0, nu}}, {{0, 0}, {0, 0}}}, {{{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{nu, 0}, {0, nu}}}} |
| Absorption coefficient | {{0, -3\*alpha, 0, 0, 0, -3\*alpha}, {3\*alpha, 0, 0, 0, 3\*alpha, 0}, {0, 0, 0, -3\*alpha, 0, 0}, {0, 0, 3\*alpha, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}} |
| Source term | {f\_au3, f\_bu3, f\_av3, f\_bv3, f\_au3, f\_bu3} |
| Mass coefficient | {{0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}} |
| Damping or mass coefficient | {{0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}} |
| Conservative flux convection coefficient | {{{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}} |
| Convection coefficient | {{{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}} |
| Conservative flux source | {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}} |

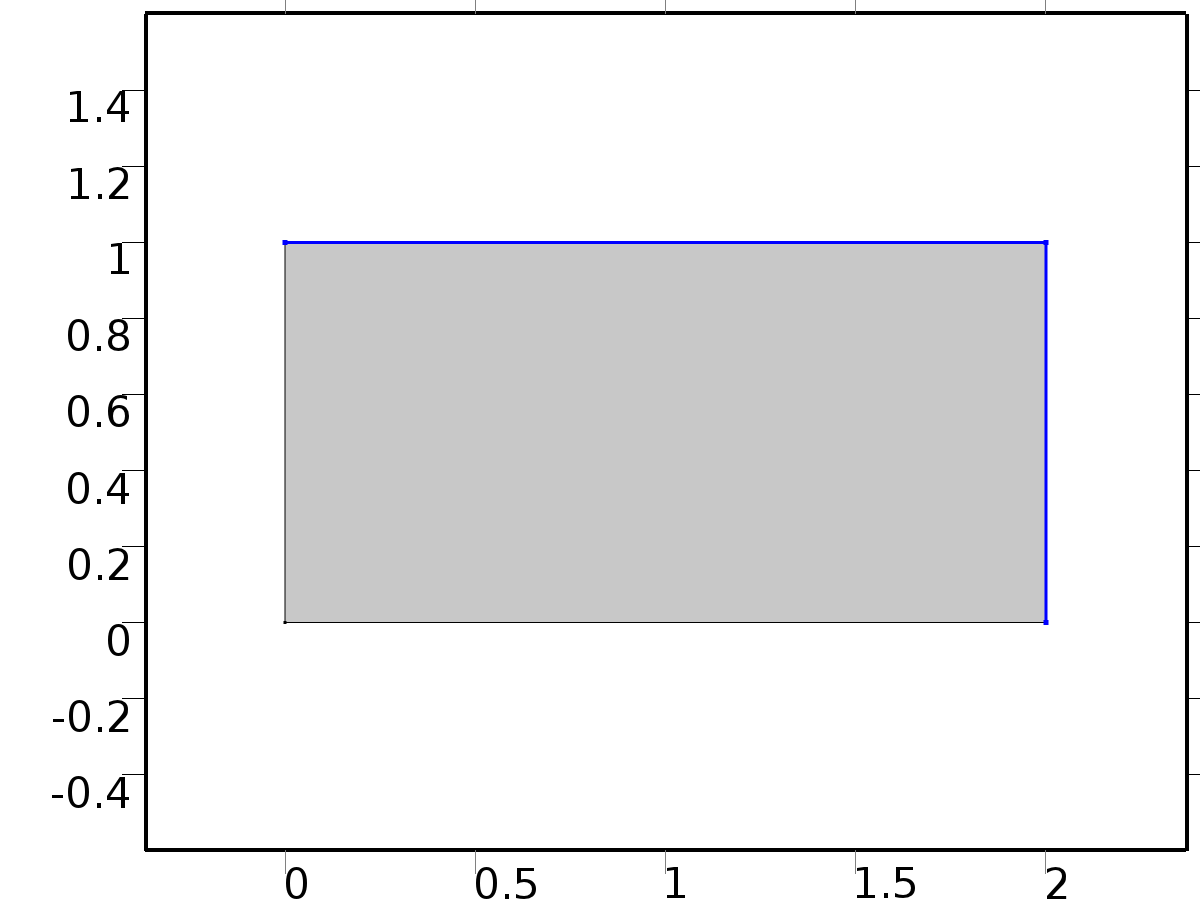
#### Variables

| **Name** | **Expression** | **Unit** | **Description** | **Selection** |
| --- | --- | --- | --- | --- |
| domflux.au3x | -nu\*d(au3,x) |  | Domain flux, x component | Domain 1 |
| domflux.au3y | -nu\*d(au3,y) |  | Domain flux, y component | Domain 1 |
| domflux.bu3x | -nu\*d(bu3,x) |  | Domain flux, x component | Domain 1 |
| domflux.bu3y | -nu\*d(bu3,y) |  | Domain flux, y component | Domain 1 |
| domflux.av3x | -nu\*d(av3,x) |  | Domain flux, x component | Domain 1 |
| domflux.av3y | -nu\*d(av3,y) |  | Domain flux, y component | Domain 1 |
| domflux.bv3x | -nu\*d(bv3,x) |  | Domain flux, x component | Domain 1 |
| domflux.bv3y | -nu\*d(bv3,y) |  | Domain flux, y component | Domain 1 |
| domflux.atu3x | -nu\*d(atu3,x) |  | Domain flux, x component | Domain 1 |
| domflux.atu3y | -nu\*d(atu3,y) |  | Domain flux, y component | Domain 1 |
| domflux.btu3x | -nu\*d(btu3,x) |  | Domain flux, x component | Domain 1 |
| domflux.btu3y | -nu\*d(btu3,y) |  | Domain flux, y component | Domain 1 |

#### Shape functions

| **Name** | **Shape function** | **Unit** | **Description** | **Shape frame** | **Selection** |
| --- | --- | --- | --- | --- | --- |
| au3 | Lagrange (Quadratic) |  | Dependent variable au3 | Material | Domain 1 |
| bu3 | Lagrange (Quadratic) |  | Dependent variable bu3 | Material | Domain 1 |
| av3 | Lagrange (Quadratic) |  | Dependent variable av3 | Material | Domain 1 |
| bv3 | Lagrange (Quadratic) |  | Dependent variable bv3 | Material | Domain 1 |
| atu3 | Lagrange (Quadratic) |  | Dependent variable atu3 | Material | Domain 1 |
| btu3 | Lagrange (Quadratic) |  | Dependent variable btu3 | Material | Domain 1 |

* + 1. Zero Flux 1



Zero Flux 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Boundary |
| Selection | Boundaries 3–4 |

Equations







* + 1. Initial Values 1



Initial Values 1

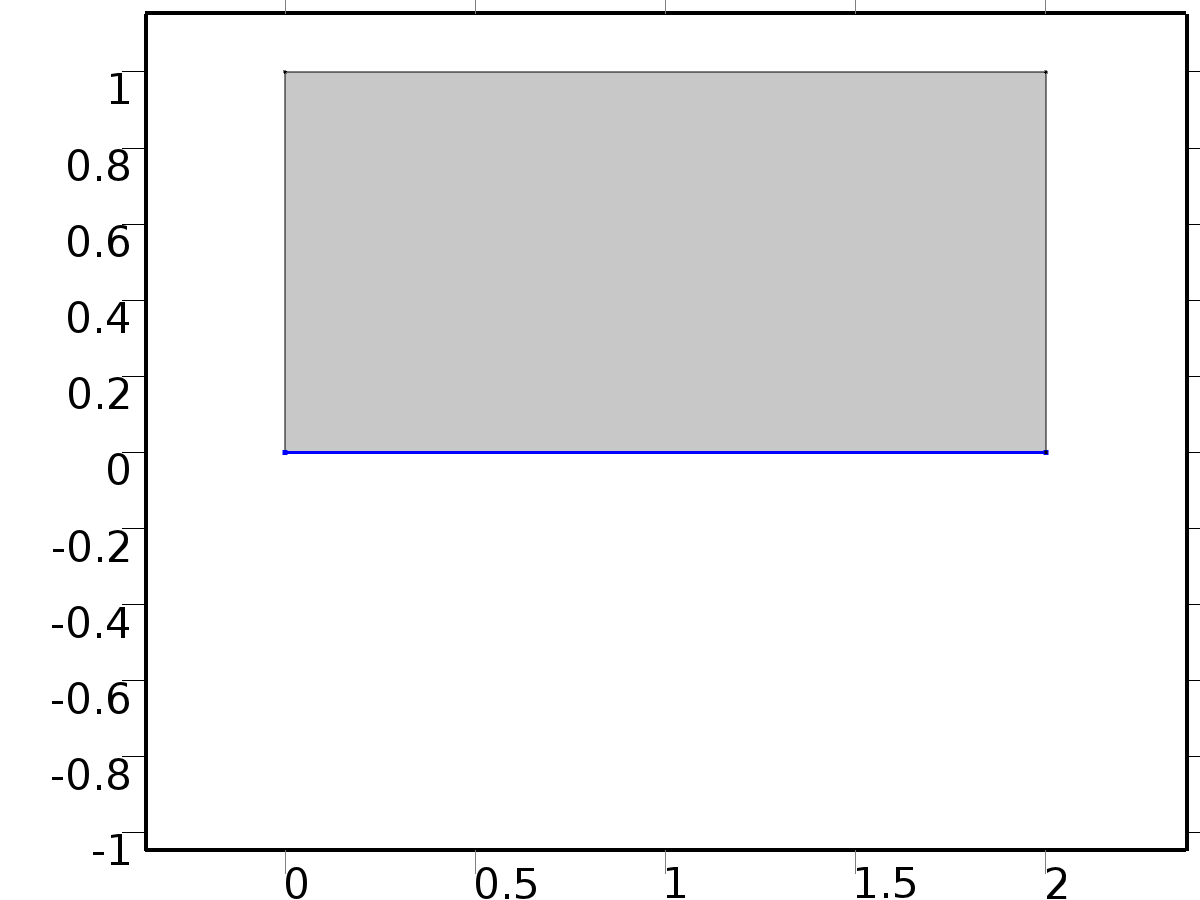
Selection

|  |  |
| --- | --- |
| Geometric entity level | Domain |
| Selection | Domain 1 |

Settings

| **Description** | **Value** |
| --- | --- |
| Initial value for au3 | 0 |
| Initial time derivative of au3 | 0 |
| Initial value for bu3 | 0 |
| Initial time derivative of bu3 | 0 |
| Initial value for av3 | 0 |
| Initial time derivative of av3 | 0 |
| Initial value for bv3 | 0 |
| Initial time derivative of bv3 | 0 |
| Initial value for atu3 | 0 |
| Initial time derivative of atu3 | 0 |
| Initial value for btu3 | 0 |
| Initial time derivative of btu3 | 0 |

* + 1. Dirichlet Boundary Condition 1



Dirichlet Boundary Condition 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Boundary |
| Selection | Boundary 2 |

Equations









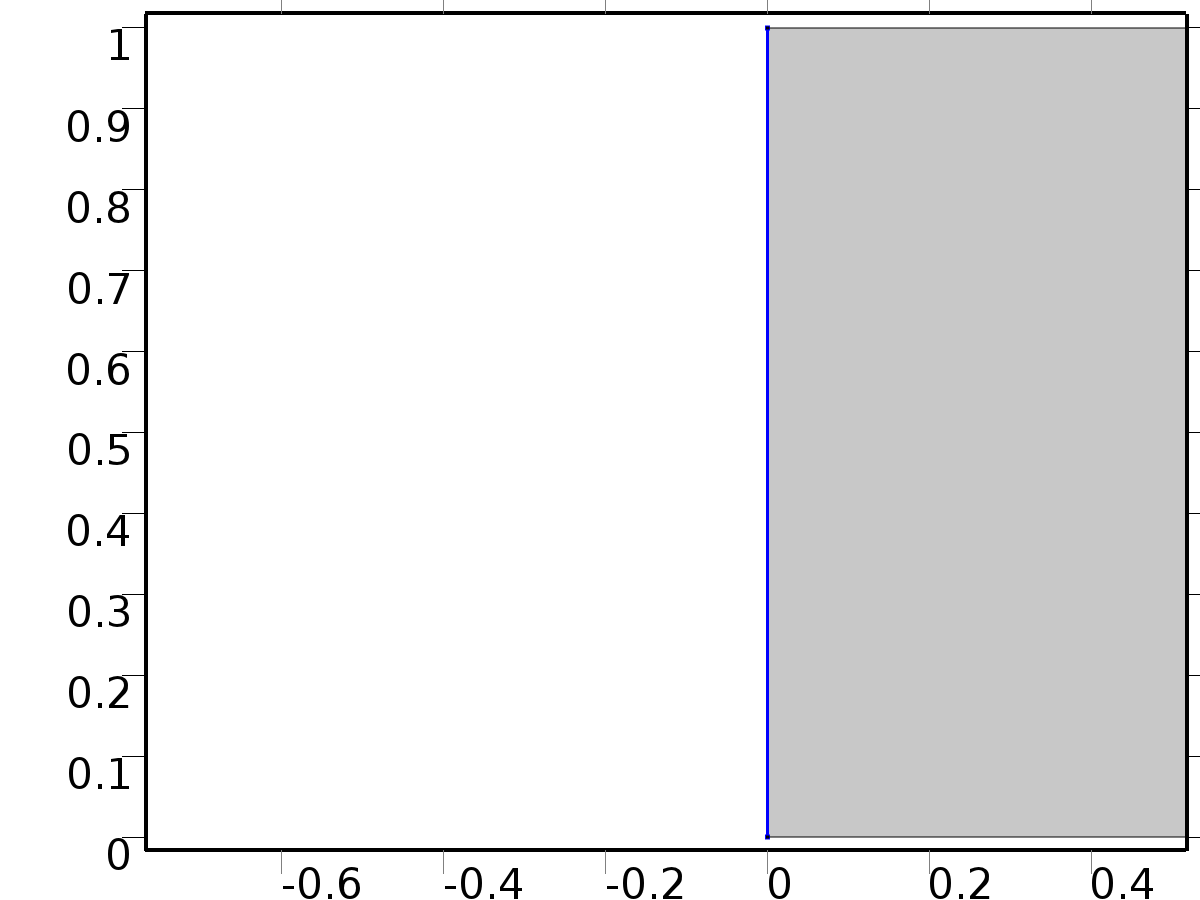
Settings

| **Description** | **Value** |
| --- | --- |
| Value on boundary | {0, 0, d\_a3, d\_b3, 0, 0} |
| Prescribed value of au3 | On |
| Prescribed value of bu3 | On |
| Prescribed value of av3 | On |
| Prescribed value of bv3 | On |
| Prescribed value of atu3 | On |
| Prescribed value of btu3 | On |
| Apply reaction terms on | Individual dependent variables |
| Use weak constraints | Off |
| Constraint method | Elemental |

#### Shape functions

| **Constraint** | **Constraint force** | **Shape function** | **Selection** |
| --- | --- | --- | --- |
| -au3 | -test(au3) | Lagrange (Quadratic) | Boundary 2 |
| -bu3 | -test(bu3) | Lagrange (Quadratic) | Boundary 2 |
| d\_a3-av3 | -test(av3) | Lagrange (Quadratic) | Boundary 2 |
| d\_b3-bv3 | -test(bv3) | Lagrange (Quadratic) | Boundary 2 |
| -atu3 | -test(atu3) | Lagrange (Quadratic) | Boundary 2 |
| -btu3 | -test(btu3) | Lagrange (Quadratic) | Boundary 2 |

* + 1. Flux/Source 1



Flux/Source 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Boundary |
| Selection | Boundary 1 |

Equations







Settings

| **Description** | **Value** |
| --- | --- |
| Boundary flux/source | {Gamma\_a3, Gamma\_b3, 0, 0, 0, 0} |
| Boundary absorption/impedance term | {{K, 0, 0, 0, 0, 0}, {0, K, 0, 0, 0, 0}, {0, 0, K, 0, 0, 0}, {0, 0, 0, K, 0, 0}, {0, 0, 0, 0, K, 0}, {0, 0, 0, 0, 0, K}} |

#### Variables

| **Name** | **Expression** | **Unit** | **Description** | **Selection** |
| --- | --- | --- | --- | --- |
| A3.g\_au3 | Gamma\_a3-K\*au3 |  | Boundary flux/source | Boundary 1 |
| A3.g\_bu3 | Gamma\_b3-K\*bu3 |  | Boundary flux/source | Boundary 1 |
| A3.g\_av3 | -K\*av3 |  | Boundary flux/source | Boundary 1 |
| A3.g\_bv3 | -K\*bv3 |  | Boundary flux/source | Boundary 1 |
| A3.g\_atu3 | -K\*atu3 |  | Boundary flux/source | Boundary 1 |
| A3.g\_btu3 | -K\*btu3 |  | Boundary flux/source | Boundary 1 |

* 1. Fourier coefficients 4



Fourier coefficients 4

Selection

|  |  |
| --- | --- |
| Geometric entity level | Domain |
| Selection | Domain 1 |

Settings

| **Description** | **Value** |
| --- | --- |
| Shape function type | Lagrange |
| Element order | Quadratic |
| Compute boundary fluxes | On |
| Apply smoothing to boundary fluxes | On |
| Value type when using splitting of complex variables | Complex |
| Dependent variable quantity | Dimensionless (1) |
| Source term quantity | None |
| Unit | m^ - 2 |

Used products

|  |
| --- |
| COMSOL Multiphysics |

Variables

| **Name** | **Expression** | **Unit** | **Description** | **Selection** |
| --- | --- | --- | --- | --- |
| A4.nx | dnx |  | Normal vector, x component | Boundaries 1–4 |
| A4.ny | dny |  | Normal vector, y component | Boundaries 1–4 |
| A4.nz | 0 |  | Normal vector, z component | Boundaries 1–4 |
| A4.nxmesh | root.dnxmesh |  | Normal vector (mesh), x component | Boundaries 1–4 |
| A4.nymesh | root.dnymesh |  | Normal vector (mesh), y component | Boundaries 1–4 |
| A4.nzmesh | 0 |  | Normal vector (mesh), z component | Boundaries 1–4 |

* + 1. Coefficient Form PDE 1



Coefficient Form PDE 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Domain |
| Selection | Domain 1 |

Equations







Settings

| **Description** | **Value** |
| --- | --- |
| Diffusion coefficient | {{{{nu, 0}, {0, nu}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}}, {{{0, 0}, {0, 0}}, {{nu, 0}, {0, nu}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}}, {{{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{nu, 0}, {0, nu}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}}, {{{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{nu, 0}, {0, nu}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}}, {{{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{nu, 0}, {0, nu}}, {{0, 0}, {0, 0}}}, {{{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{nu, 0}, {0, nu}}}} |
| Absorption coefficient | {{0, -4\*alpha, 0, 0, 0, -4\*alpha}, {4\*alpha, 0, 0, 0, 4\*alpha, 0}, {0, 0, 0, -4\*alpha, 0, 0}, {0, 0, 4\*alpha, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}} |
| Source term | {f\_au4, f\_bu4, f\_av4, f\_bv4, f\_au4, f\_bu4} |
| Mass coefficient | {{0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}} |
| Damping or mass coefficient | {{0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}} |
| Conservative flux convection coefficient | {{{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}} |
| Convection coefficient | {{{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}} |
| Conservative flux source | {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}} |

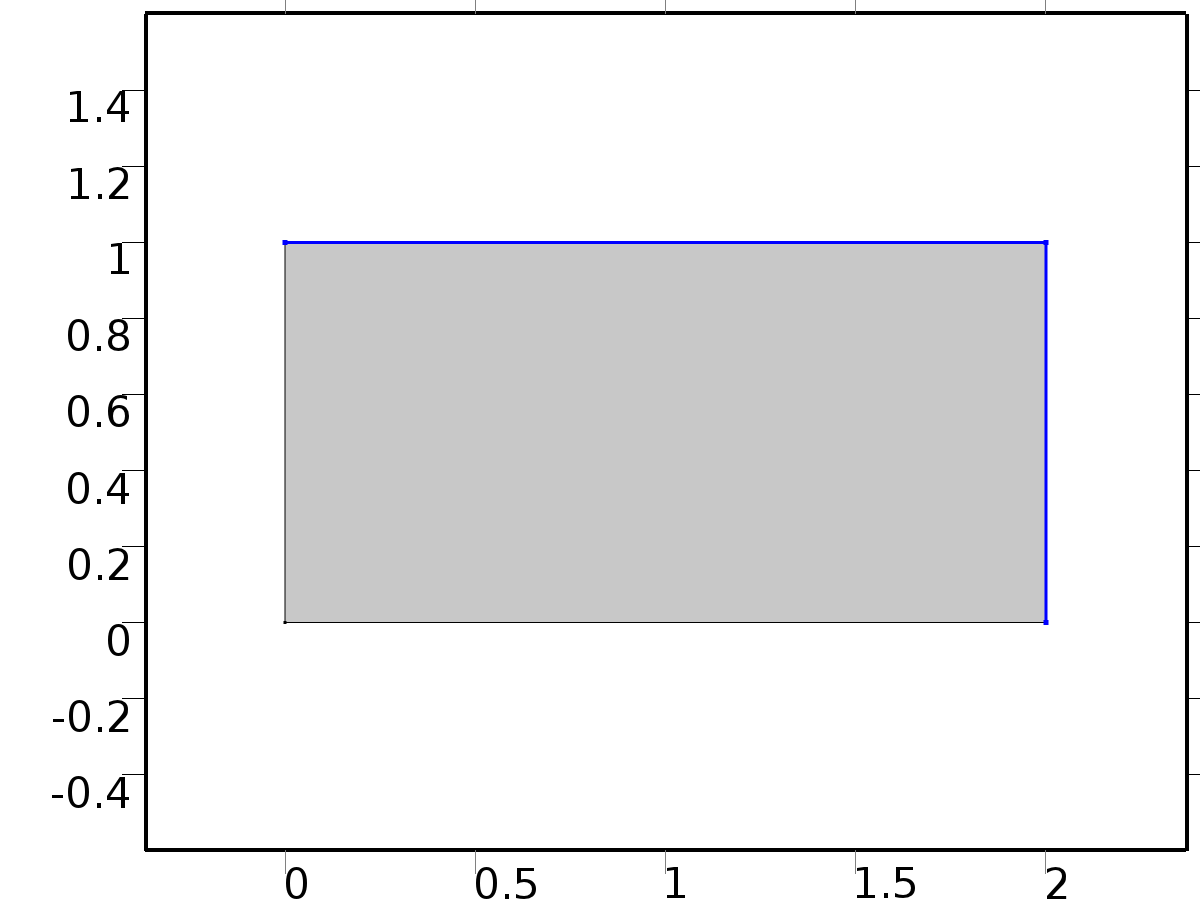
#### Variables

| **Name** | **Expression** | **Unit** | **Description** | **Selection** |
| --- | --- | --- | --- | --- |
| domflux.au4x | -nu\*d(au4,x) |  | Domain flux, x component | Domain 1 |
| domflux.au4y | -nu\*d(au4,y) |  | Domain flux, y component | Domain 1 |
| domflux.bu4x | -nu\*d(bu4,x) |  | Domain flux, x component | Domain 1 |
| domflux.bu4y | -nu\*d(bu4,y) |  | Domain flux, y component | Domain 1 |
| domflux.av4x | -nu\*d(av4,x) |  | Domain flux, x component | Domain 1 |
| domflux.av4y | -nu\*d(av4,y) |  | Domain flux, y component | Domain 1 |
| domflux.bv4x | -nu\*d(bv4,x) |  | Domain flux, x component | Domain 1 |
| domflux.bv4y | -nu\*d(bv4,y) |  | Domain flux, y component | Domain 1 |
| domflux.atu4x | -nu\*d(atu4,x) |  | Domain flux, x component | Domain 1 |
| domflux.atu4y | -nu\*d(atu4,y) |  | Domain flux, y component | Domain 1 |
| domflux.btu4x | -nu\*d(btu4,x) |  | Domain flux, x component | Domain 1 |
| domflux.btu4y | -nu\*d(btu4,y) |  | Domain flux, y component | Domain 1 |

#### Shape functions

| **Name** | **Shape function** | **Unit** | **Description** | **Shape frame** | **Selection** |
| --- | --- | --- | --- | --- | --- |
| au4 | Lagrange (Quadratic) |  | Dependent variable au4 | Material | Domain 1 |
| bu4 | Lagrange (Quadratic) |  | Dependent variable bu4 | Material | Domain 1 |
| av4 | Lagrange (Quadratic) |  | Dependent variable av4 | Material | Domain 1 |
| bv4 | Lagrange (Quadratic) |  | Dependent variable bv4 | Material | Domain 1 |
| atu4 | Lagrange (Quadratic) |  | Dependent variable atu4 | Material | Domain 1 |
| btu4 | Lagrange (Quadratic) |  | Dependent variable btu4 | Material | Domain 1 |

* + 1. Zero Flux 1



Zero Flux 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Boundary |
| Selection | Boundaries 3–4 |

Equations







* + 1. Initial Values 1



Initial Values 1

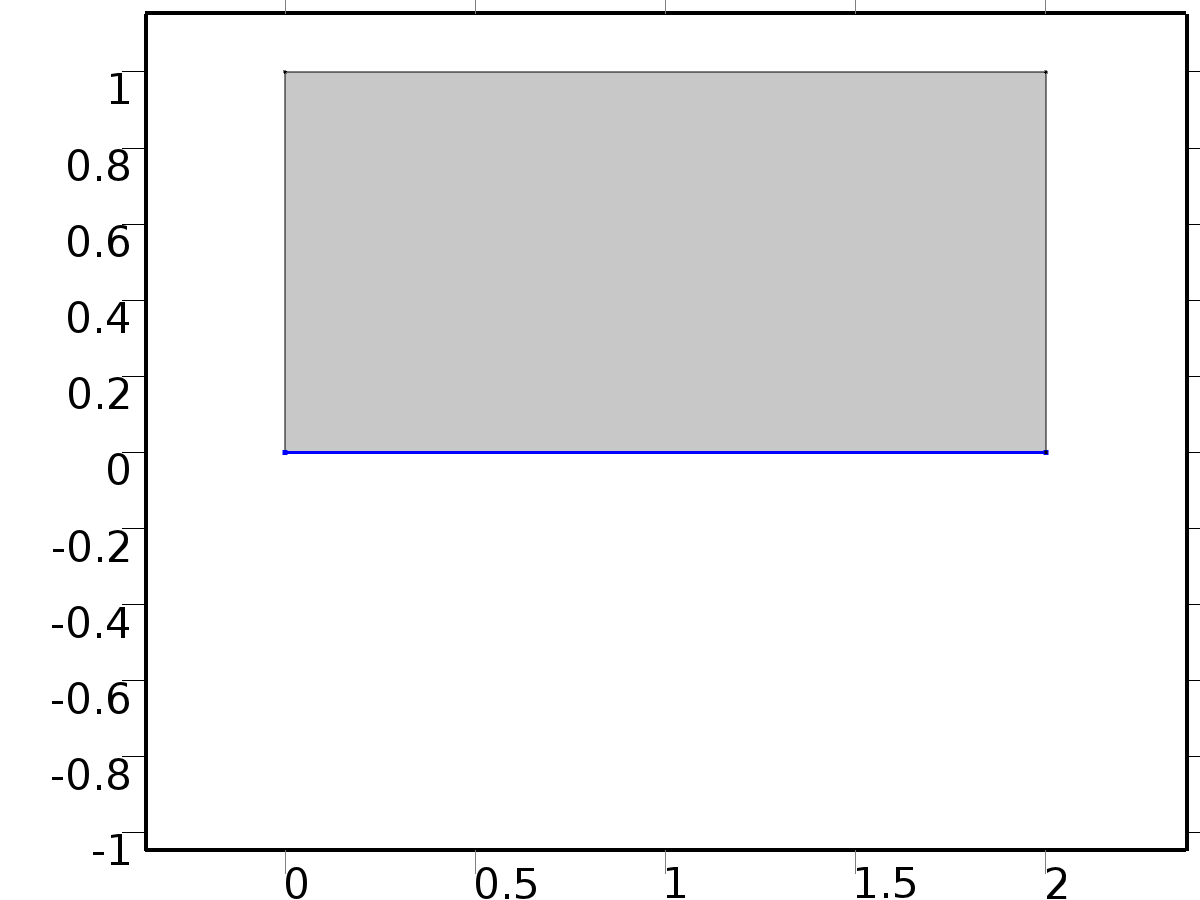
Selection

|  |  |
| --- | --- |
| Geometric entity level | Domain |
| Selection | Domain 1 |

Settings

| **Description** | **Value** |
| --- | --- |
| Initial value for au4 | 0 |
| Initial time derivative of au4 | 0 |
| Initial value for bu4 | 0 |
| Initial time derivative of bu4 | 0 |
| Initial value for av4 | 0 |
| Initial time derivative of av4 | 0 |
| Initial value for bv4 | 0 |
| Initial time derivative of bv4 | 0 |
| Initial value for atu4 | 0 |
| Initial time derivative of atu4 | 0 |
| Initial value for btu4 | 0 |
| Initial time derivative of btu4 | 0 |

* + 1. Dirichlet Boundary Condition 1



Dirichlet Boundary Condition 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Boundary |
| Selection | Boundary 2 |

Equations









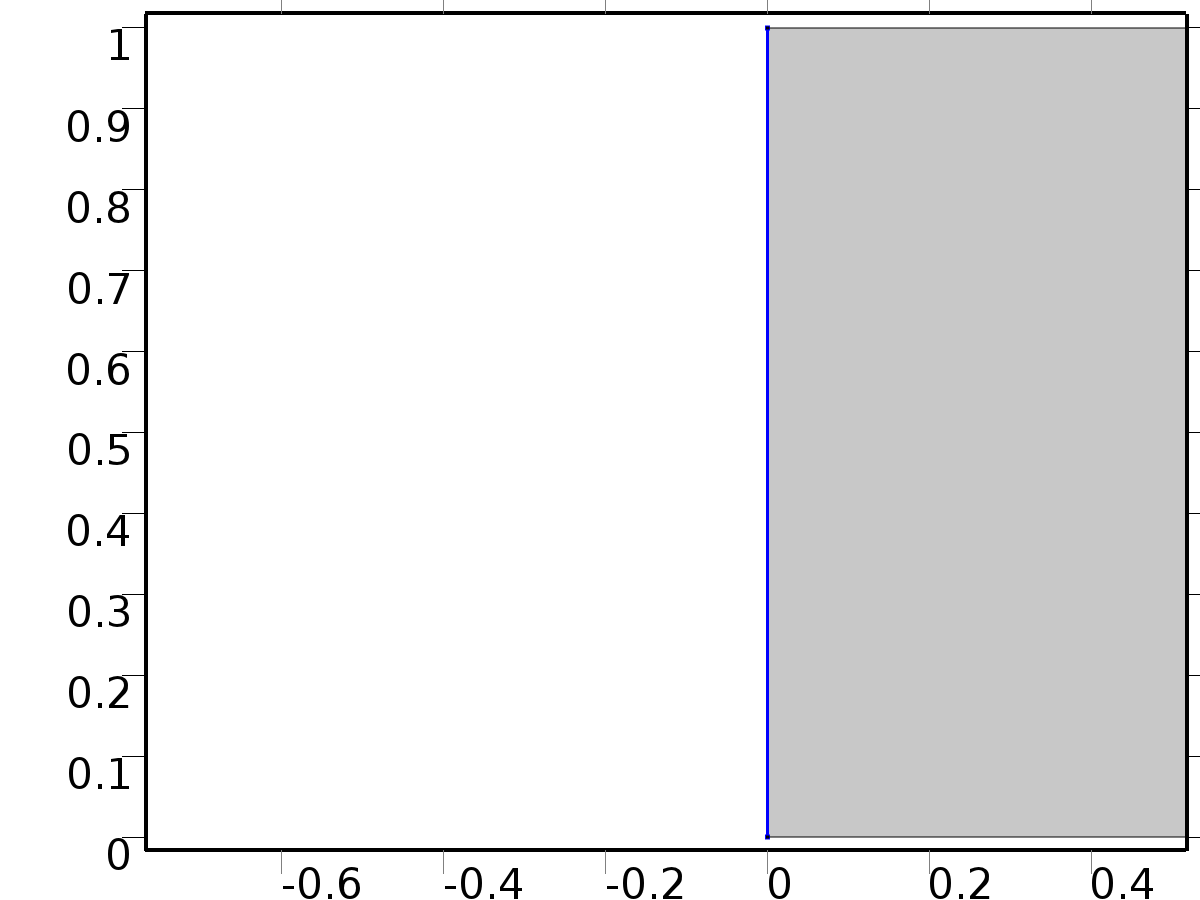
Settings

| **Description** | **Value** |
| --- | --- |
| Value on boundary | {0, 0, d\_a4, d\_b4, 0, 0} |
| Prescribed value of au4 | On |
| Prescribed value of bu4 | On |
| Prescribed value of av4 | On |
| Prescribed value of bv4 | On |
| Prescribed value of atu4 | On |
| Prescribed value of btu4 | On |
| Apply reaction terms on | Individual dependent variables |
| Use weak constraints | Off |
| Constraint method | Elemental |

#### Shape functions

| **Constraint** | **Constraint force** | **Shape function** | **Selection** |
| --- | --- | --- | --- |
| -au4 | -test(au4) | Lagrange (Quadratic) | Boundary 2 |
| -bu4 | -test(bu4) | Lagrange (Quadratic) | Boundary 2 |
| d\_a4-av4 | -test(av4) | Lagrange (Quadratic) | Boundary 2 |
| d\_b4-bv4 | -test(bv4) | Lagrange (Quadratic) | Boundary 2 |
| -atu4 | -test(atu4) | Lagrange (Quadratic) | Boundary 2 |
| -btu4 | -test(btu4) | Lagrange (Quadratic) | Boundary 2 |

* + 1. Flux/Source 1



Flux/Source 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Boundary |
| Selection | Boundary 1 |

Equations







Settings

| **Description** | **Value** |
| --- | --- |
| Boundary flux/source | {Gamma\_a4, Gamma\_b4, 0, 0, 0, 0} |
| Boundary absorption/impedance term | {{K, 0, 0, 0, 0, 0}, {0, K, 0, 0, 0, 0}, {0, 0, K, 0, 0, 0}, {0, 0, 0, K, 0, 0}, {0, 0, 0, 0, K, 0}, {0, 0, 0, 0, 0, K}} |

#### Variables

| **Name** | **Expression** | **Unit** | **Description** | **Selection** |
| --- | --- | --- | --- | --- |
| A4.g\_au4 | Gamma\_a4-K\*au4 |  | Boundary flux/source | Boundary 1 |
| A4.g\_bu4 | Gamma\_b4-K\*bu4 |  | Boundary flux/source | Boundary 1 |
| A4.g\_av4 | -K\*av4 |  | Boundary flux/source | Boundary 1 |
| A4.g\_bv4 | -K\*bv4 |  | Boundary flux/source | Boundary 1 |
| A4.g\_atu4 | -K\*atu4 |  | Boundary flux/source | Boundary 1 |
| A4.g\_btu4 | -K\*btu4 |  | Boundary flux/source | Boundary 1 |

* 1. Fourier coefficients 5



Fourier coefficients 5

Selection

|  |  |
| --- | --- |
| Geometric entity level | Domain |
| Selection | Domain 1 |

Settings

| **Description** | **Value** |
| --- | --- |
| Shape function type | Lagrange |
| Element order | Quadratic |
| Compute boundary fluxes | On |
| Apply smoothing to boundary fluxes | On |
| Value type when using splitting of complex variables | Complex |
| Dependent variable quantity | Dimensionless (1) |
| Source term quantity | None |
| Unit | m^ - 2 |

Used products

|  |
| --- |
| COMSOL Multiphysics |

Variables

| **Name** | **Expression** | **Unit** | **Description** | **Selection** |
| --- | --- | --- | --- | --- |
| A5.nx | dnx |  | Normal vector, x component | Boundaries 1–4 |
| A5.ny | dny |  | Normal vector, y component | Boundaries 1–4 |
| A5.nz | 0 |  | Normal vector, z component | Boundaries 1–4 |
| A5.nxmesh | root.dnxmesh |  | Normal vector (mesh), x component | Boundaries 1–4 |
| A5.nymesh | root.dnymesh |  | Normal vector (mesh), y component | Boundaries 1–4 |
| A5.nzmesh | 0 |  | Normal vector (mesh), z component | Boundaries 1–4 |

* + 1. Coefficient Form PDE 1



Coefficient Form PDE 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Domain |
| Selection | Domain 1 |

Equations







Settings

| **Description** | **Value** |
| --- | --- |
| Diffusion coefficient | {{{{nu, 0}, {0, nu}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}}, {{{0, 0}, {0, 0}}, {{nu, 0}, {0, nu}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}}, {{{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{nu, 0}, {0, nu}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}}, {{{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{nu, 0}, {0, nu}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}}, {{{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{nu, 0}, {0, nu}}, {{0, 0}, {0, 0}}}, {{{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}, {{nu, 0}, {0, nu}}}} |
| Absorption coefficient | {{0, -5\*alpha, 0, 0, 0, -5\*alpha}, {5\*alpha, 0, 0, 0, 5\*alpha, 0}, {0, 0, 0, -5\*alpha, 0, 0}, {0, 0, 5\*alpha, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}} |
| Source term | {f\_au5, f\_bu5, f\_av5, f\_bv5, f\_au5, f\_bu5} |
| Mass coefficient | {{0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}} |
| Damping or mass coefficient | {{0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0}} |
| Conservative flux convection coefficient | {{{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}} |
| Convection coefficient | {{{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}, {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}}} |
| Conservative flux source | {{0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}, {0, 0}} |

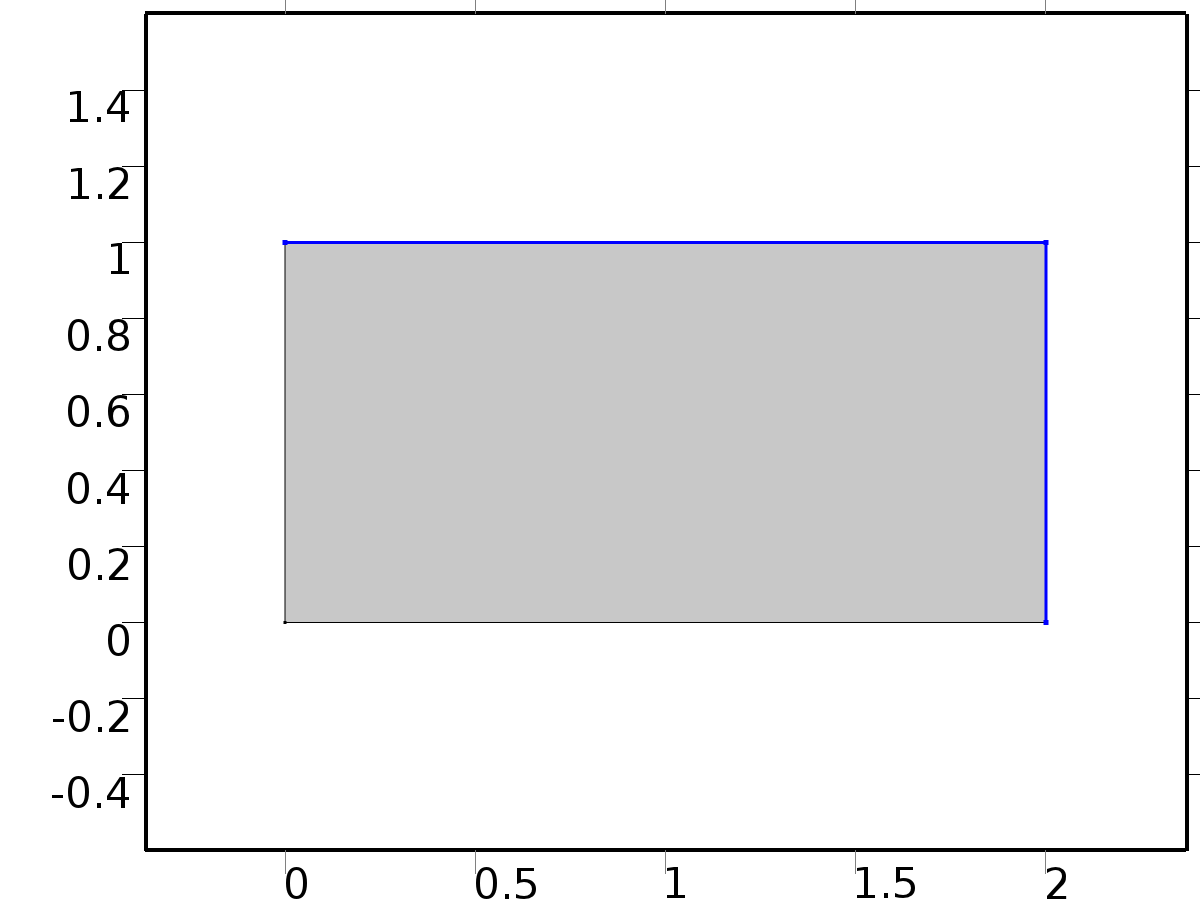
#### Variables

| **Name** | **Expression** | **Unit** | **Description** | **Selection** |
| --- | --- | --- | --- | --- |
| domflux.au5x | -nu\*d(au5,x) |  | Domain flux, x component | Domain 1 |
| domflux.au5y | -nu\*d(au5,y) |  | Domain flux, y component | Domain 1 |
| domflux.bu5x | -nu\*d(bu5,x) |  | Domain flux, x component | Domain 1 |
| domflux.bu5y | -nu\*d(bu5,y) |  | Domain flux, y component | Domain 1 |
| domflux.av5x | -nu\*d(av5,x) |  | Domain flux, x component | Domain 1 |
| domflux.av5y | -nu\*d(av5,y) |  | Domain flux, y component | Domain 1 |
| domflux.bv5x | -nu\*d(bv5,x) |  | Domain flux, x component | Domain 1 |
| domflux.bv5y | -nu\*d(bv5,y) |  | Domain flux, y component | Domain 1 |
| domflux.atu5x | -nu\*d(atu5,x) |  | Domain flux, x component | Domain 1 |
| domflux.atu5y | -nu\*d(atu5,y) |  | Domain flux, y component | Domain 1 |
| domflux.btu5x | -nu\*d(btu5,x) |  | Domain flux, x component | Domain 1 |
| domflux.btu5y | -nu\*d(btu5,y) |  | Domain flux, y component | Domain 1 |

#### Shape functions

| **Name** | **Shape function** | **Unit** | **Description** | **Shape frame** | **Selection** |
| --- | --- | --- | --- | --- | --- |
| au5 | Lagrange (Quadratic) |  | Dependent variable au5 | Material | Domain 1 |
| bu5 | Lagrange (Quadratic) |  | Dependent variable bu5 | Material | Domain 1 |
| av5 | Lagrange (Quadratic) |  | Dependent variable av5 | Material | Domain 1 |
| bv5 | Lagrange (Quadratic) |  | Dependent variable bv5 | Material | Domain 1 |
| atu5 | Lagrange (Quadratic) |  | Dependent variable atu5 | Material | Domain 1 |
| btu5 | Lagrange (Quadratic) |  | Dependent variable btu5 | Material | Domain 1 |

* + 1. Zero Flux 1



Zero Flux 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Boundary |
| Selection | Boundaries 3–4 |

Equations







* + 1. Initial Values 1



Initial Values 1

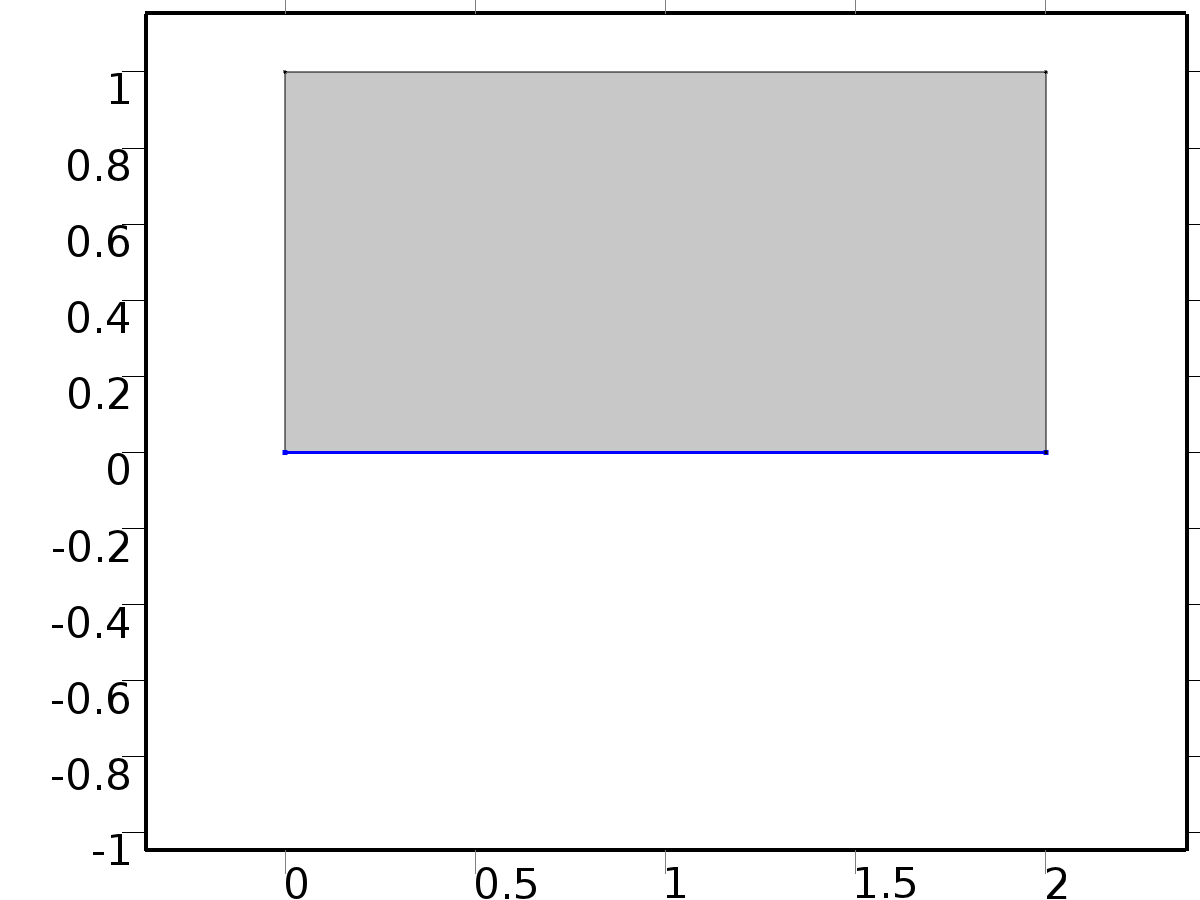
Selection

|  |  |
| --- | --- |
| Geometric entity level | Domain |
| Selection | Domain 1 |

Settings

| **Description** | **Value** |
| --- | --- |
| Initial value for au5 | 0 |
| Initial time derivative of au5 | 0 |
| Initial value for bu5 | 0 |
| Initial time derivative of bu5 | 0 |
| Initial value for av5 | 0 |
| Initial time derivative of av5 | 0 |
| Initial value for bv5 | 0 |
| Initial time derivative of bv5 | 0 |
| Initial value for atu5 | 0 |
| Initial time derivative of atu5 | 0 |
| Initial value for btu5 | 0 |
| Initial time derivative of btu5 | 0 |

* + 1. Dirichlet Boundary Condition 1



Dirichlet Boundary Condition 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Boundary |
| Selection | Boundary 2 |

Equations









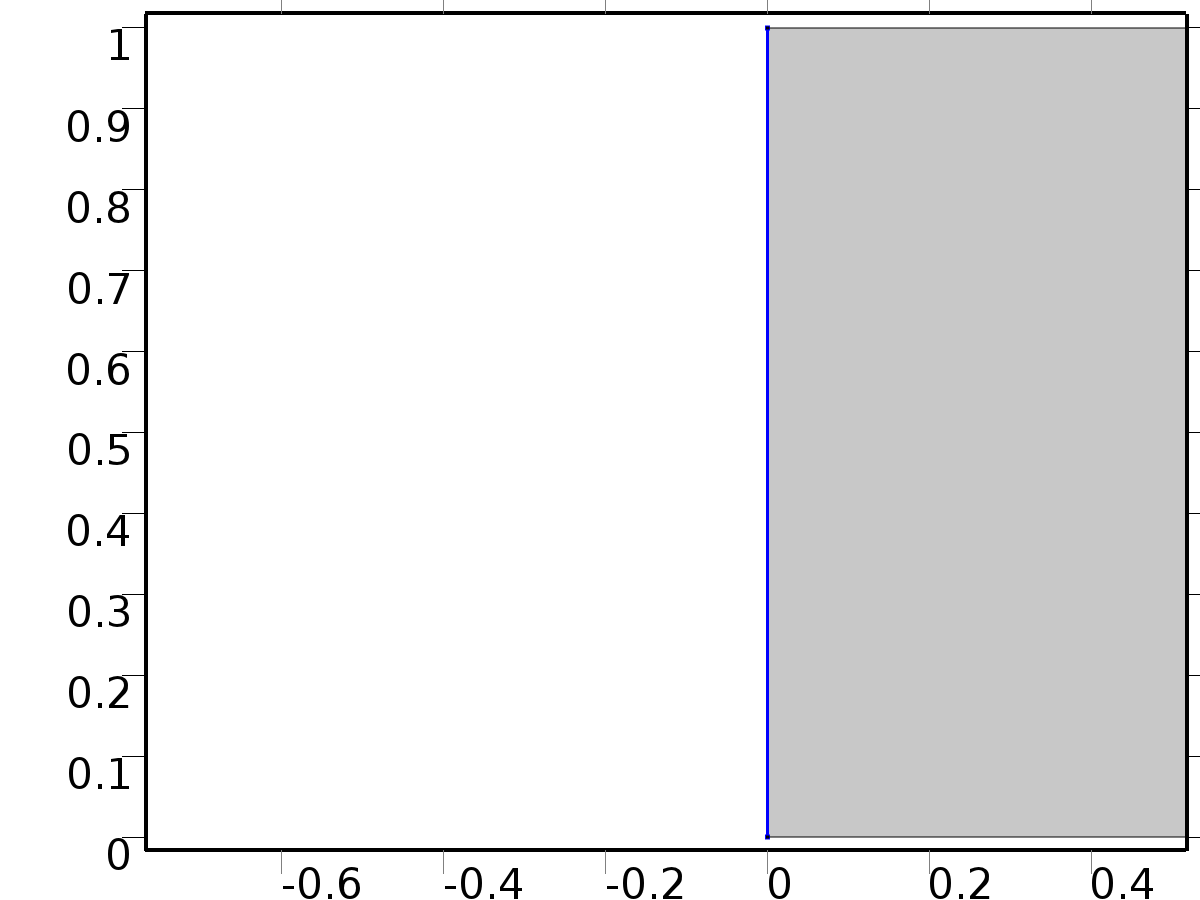
Settings

| **Description** | **Value** |
| --- | --- |
| Value on boundary | {0, 0, d\_a5, d\_b5, 0, 0} |
| Prescribed value of au5 | On |
| Prescribed value of bu5 | On |
| Prescribed value of av5 | On |
| Prescribed value of bv5 | On |
| Prescribed value of atu5 | On |
| Prescribed value of btu5 | On |
| Apply reaction terms on | Individual dependent variables |
| Use weak constraints | Off |
| Constraint method | Elemental |

#### Shape functions

| **Constraint** | **Constraint force** | **Shape function** | **Selection** |
| --- | --- | --- | --- |
| -au5 | -test(au5) | Lagrange (Quadratic) | Boundary 2 |
| -bu5 | -test(bu5) | Lagrange (Quadratic) | Boundary 2 |
| d\_a5-av5 | -test(av5) | Lagrange (Quadratic) | Boundary 2 |
| d\_b5-bv5 | -test(bv5) | Lagrange (Quadratic) | Boundary 2 |
| -atu5 | -test(atu5) | Lagrange (Quadratic) | Boundary 2 |
| -btu5 | -test(btu5) | Lagrange (Quadratic) | Boundary 2 |

* + 1. Flux/Source 1



Flux/Source 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Boundary |
| Selection | Boundary 1 |

Equations







Settings

| **Description** | **Value** |
| --- | --- |
| Boundary flux/source | {Gamma\_a5, Gamma\_b5, 0, 0, 0, 0} |
| Boundary absorption/impedance term | {{K, 0, 0, 0, 0, 0}, {0, K, 0, 0, 0, 0}, {0, 0, K, 0, 0, 0}, {0, 0, 0, K, 0, 0}, {0, 0, 0, 0, K, 0}, {0, 0, 0, 0, 0, K}} |

#### Variables

| **Name** | **Expression** | **Unit** | **Description** | **Selection** |
| --- | --- | --- | --- | --- |
| A5.g\_au5 | Gamma\_a5-K\*au5 |  | Boundary flux/source | Boundary 1 |
| A5.g\_bu5 | Gamma\_b5-K\*bu5 |  | Boundary flux/source | Boundary 1 |
| A5.g\_av5 | -K\*av5 |  | Boundary flux/source | Boundary 1 |
| A5.g\_bv5 | -K\*bv5 |  | Boundary flux/source | Boundary 1 |
| A5.g\_atu5 | -K\*atu5 |  | Boundary flux/source | Boundary 1 |
| A5.g\_btu5 | -K\*btu5 |  | Boundary flux/source | Boundary 1 |

* 1. Closed loop system



Closed loop system

Selection

|  |  |
| --- | --- |
| Geometric entity level | Domain |
| Selection | Domain 1 |

Settings

| **Description** | **Value** |
| --- | --- |
| Shape function type | Lagrange |
| Element order | Quadratic |
| Compute boundary fluxes | On |
| Apply smoothing to boundary fluxes | On |
| Value type when using splitting of complex variables | Complex |
| Dependent variable quantity | Dimensionless (1) |
| Source term quantity | None |
| Unit | m^ - 2 |

Used products

|  |
| --- |
| COMSOL Multiphysics |

Variables

| **Name** | **Expression** | **Unit** | **Description** | **Selection** |
| --- | --- | --- | --- | --- |
| cls.nx | dnx |  | Normal vector, x component | Boundaries 1–4 |
| cls.ny | dny |  | Normal vector, y component | Boundaries 1–4 |
| cls.nz | 0 |  | Normal vector, z component | Boundaries 1–4 |
| cls.nxmesh | root.dnxmesh |  | Normal vector (mesh), x component | Boundaries 1–4 |
| cls.nymesh | root.dnymesh |  | Normal vector (mesh), y component | Boundaries 1–4 |
| cls.nzmesh | 0 |  | Normal vector (mesh), z component | Boundaries 1–4 |

* + 1. Coefficient Form PDE 1



Coefficient Form PDE 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Domain |
| Selection | Domain 1 |

Equations







Settings

| **Description** | **Value** |
| --- | --- |
| Diffusion coefficient | {{{{nu, 0}, {0, nu}}, {{0, 0}, {0, 0}}}, {{{0, 0}, {0, 0}}, {{nu, 0}, {0, nu}}}} |
| Absorption coefficient | {{0, 0}, {0, 0}} |
| Source term | {0, 0} |
| Mass coefficient | {{0, 0}, {0, 0}} |
| Damping or mass coefficient | {{1, 0}, {0, 1}} |
| Conservative flux convection coefficient | {{{0, 0}, {0, 0}}, {{0, 0}, {0, 0}}} |
| Convection coefficient | {{{u, v}, {0, 0}}, {{0, 0}, {u, v}}} |
| Conservative flux source | {{0, 0}, {0, 0}} |

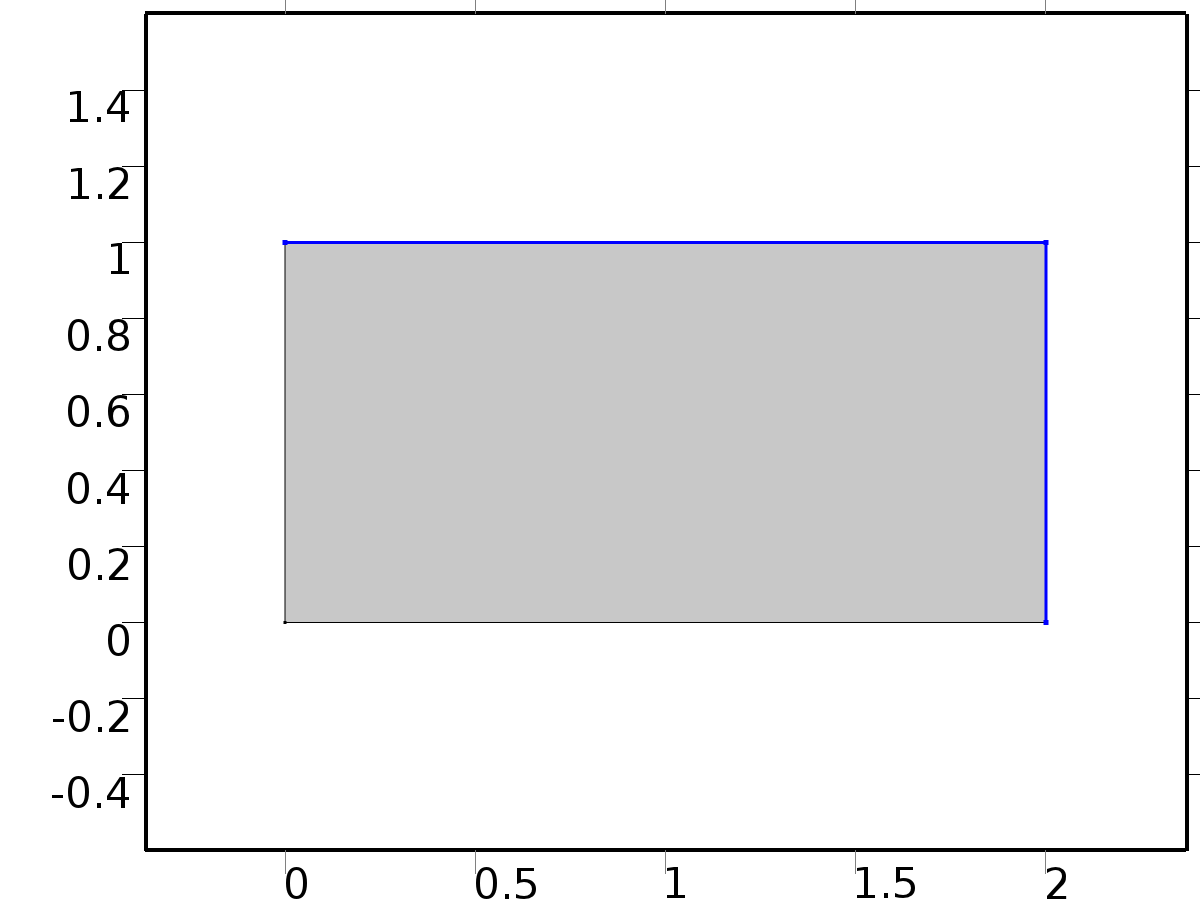
#### Variables

| **Name** | **Expression** | **Unit** | **Description** | **Selection** |
| --- | --- | --- | --- | --- |
| domflux.ux | -nu\*d(u,x) |  | Domain flux, x component | Domain 1 |
| domflux.uy | -nu\*d(u,y) |  | Domain flux, y component | Domain 1 |
| domflux.vx | -nu\*d(v,x) |  | Domain flux, x component | Domain 1 |
| domflux.vy | -nu\*d(v,y) |  | Domain flux, y component | Domain 1 |

#### Shape functions

| **Name** | **Shape function** | **Unit** | **Description** | **Shape frame** | **Selection** |
| --- | --- | --- | --- | --- | --- |
| u | Lagrange (Quadratic) |  | Dependent variable u | Material | Domain 1 |
| v | Lagrange (Quadratic) |  | Dependent variable v | Material | Domain 1 |

* + 1. Zero Flux 1



Zero Flux 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Boundary |
| Selection | Boundaries 3–4 |

Equations







* + 1. Initial Values 1



Initial Values 1

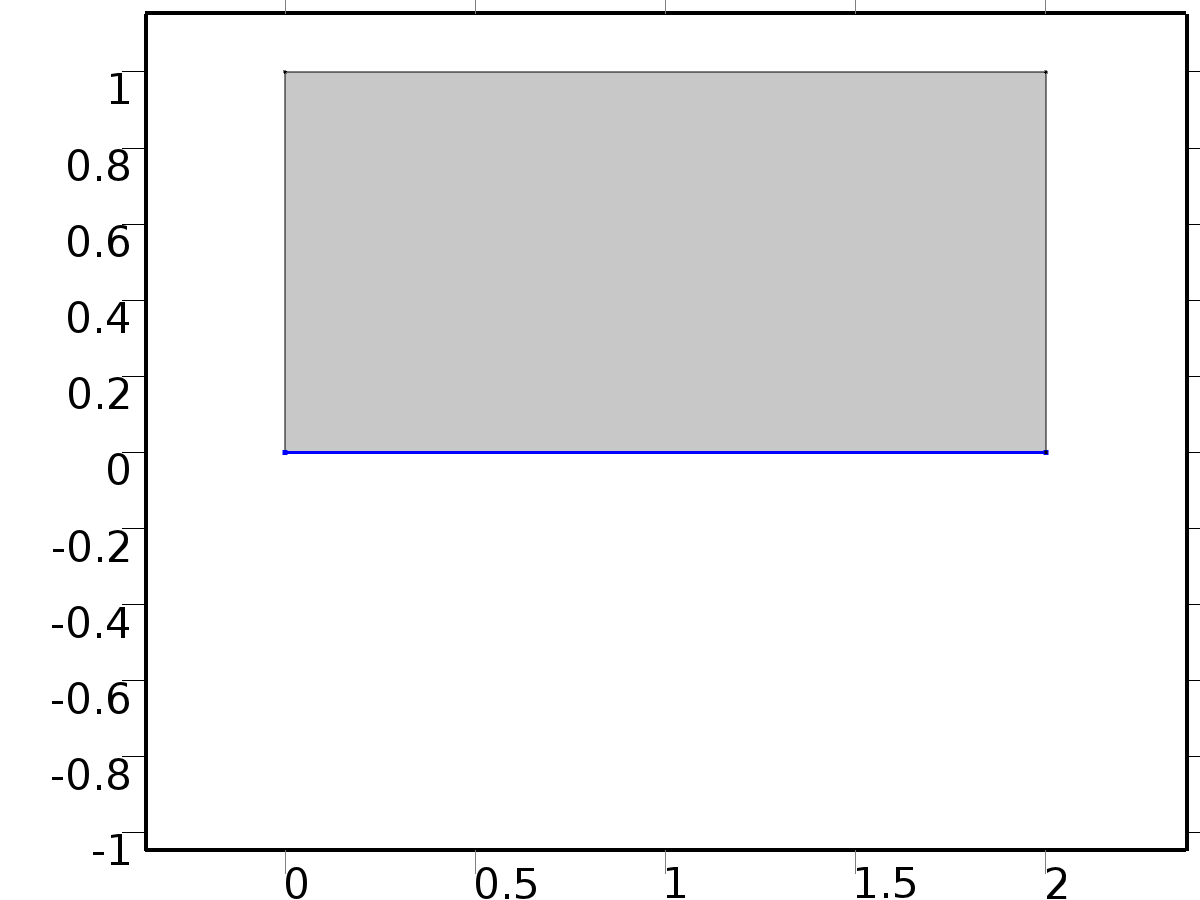
Selection

|  |  |
| --- | --- |
| Geometric entity level | Domain |
| Selection | Domain 1 |

Settings

| **Description** | **Value** |
| --- | --- |
| Initial value for u | 0 |
| Initial time derivative of u | 0 |
| Initial value for v | 0 |
| Initial time derivative of v | 0 |

* + 1. Dirichlet Boundary Condition 1



Dirichlet Boundary Condition 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Boundary |
| Selection | Boundary 2 |

Equations









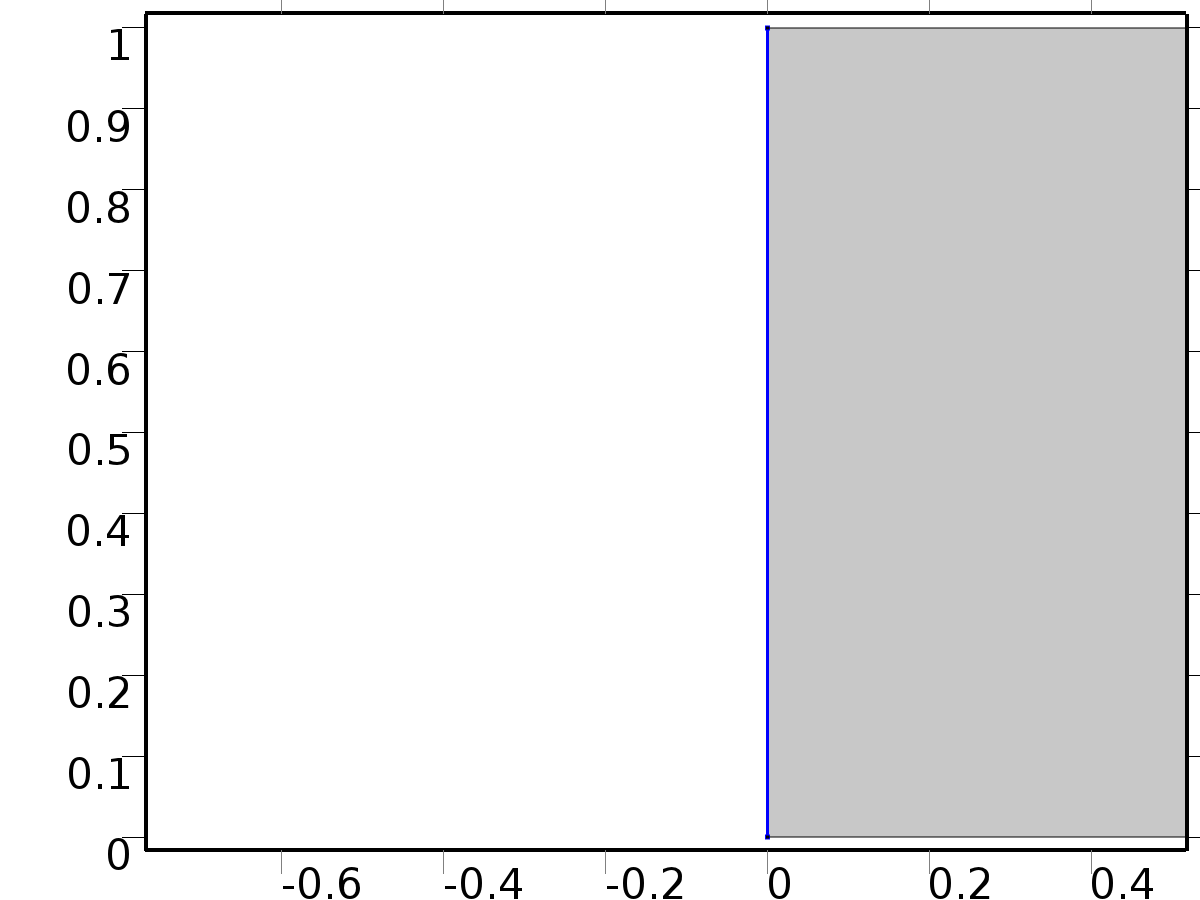
Settings

| **Description** | **Value** |
| --- | --- |
| Value on boundary | {0, d} |
| Prescribed value of u | On |
| Prescribed value of v | On |
| Apply reaction terms on | Individual dependent variables |
| Use weak constraints | Off |
| Constraint method | Elemental |

#### Shape functions

| **Constraint** | **Constraint force** | **Shape function** | **Selection** |
| --- | --- | --- | --- |
| -u | -test(u) | Lagrange (Quadratic) | Boundary 2 |
| d-v | -test(v) | Lagrange (Quadratic) | Boundary 2 |

* + 1. Flux/Source 1



Flux/Source 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Boundary |
| Selection | Boundary 1 |

Equations







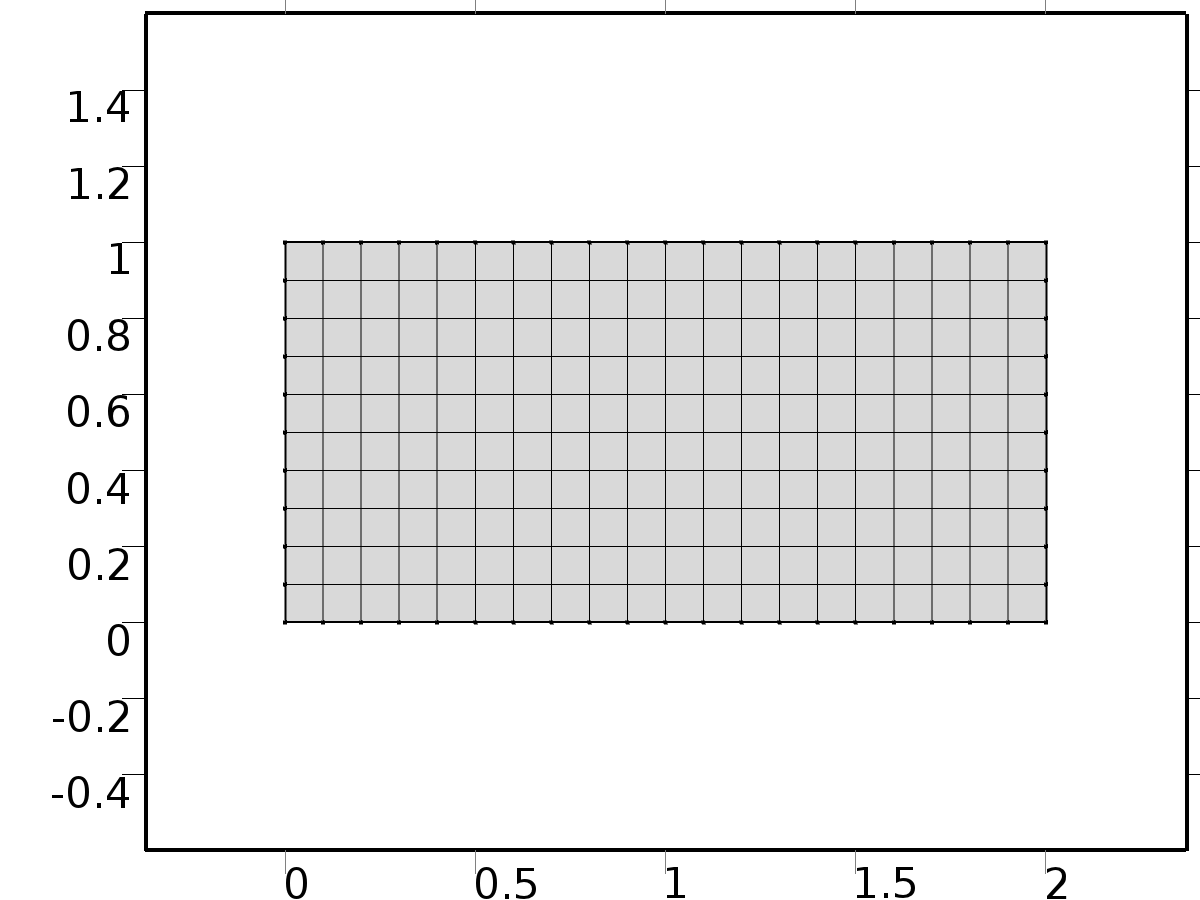
Settings

| **Description** | **Value** |
| --- | --- |
| Boundary flux/source | {gamma, 0} |
| Boundary absorption/impedance term | {{K, 0}, {0, K}} |

#### Variables

| **Name** | **Expression** | **Unit** | **Description** | **Selection** |
| --- | --- | --- | --- | --- |
| cls.g\_u | gamma-K\*u |  | Boundary flux/source | Boundary 1 |
| cls.g\_v | -K\*v |  | Boundary flux/source | Boundary 1 |

* 1. Mesh 1



Mesh 1

* + 1. Size (size)

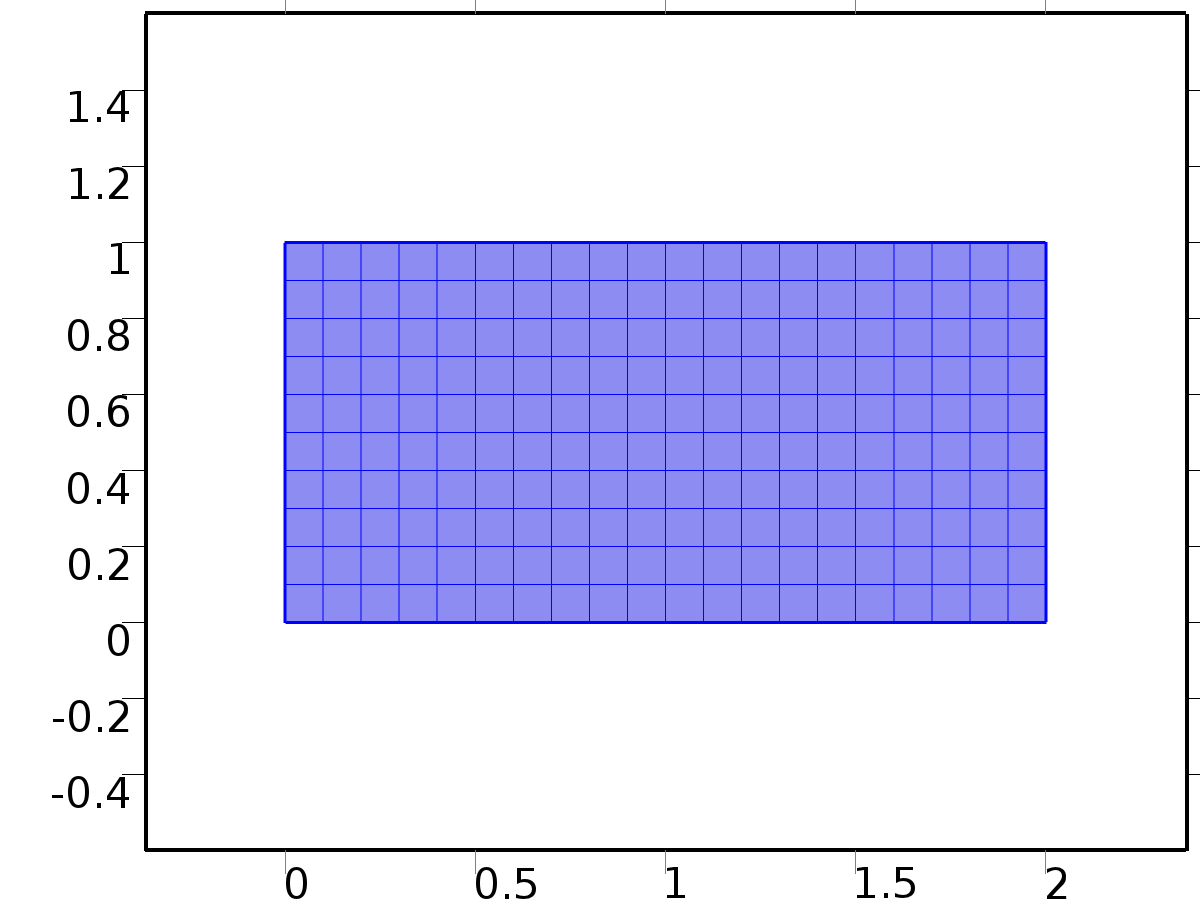
Settings

| **Description** | **Value** |
| --- | --- |
| Maximum element size | 0.134 |
| Minimum element size | 6.0E-4 |
| Curvature factor | 0.3 |
| Maximum element growth rate | 1.3 |

* + 1. Mapped 1 (map1)

Selection

|  |  |
| --- | --- |
| Geometric entity level | Domain |
| Selection | Domain 1 |

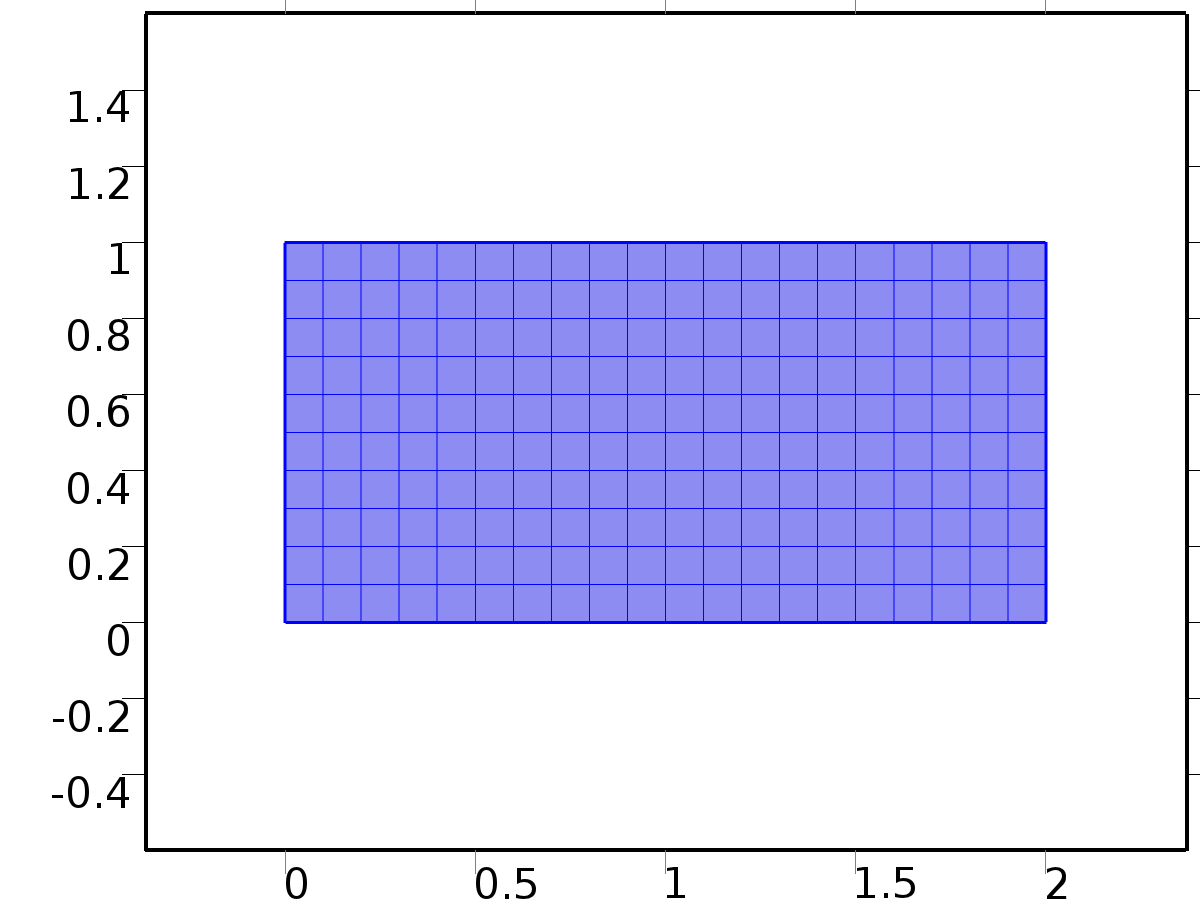


Mapped 1

#### Size 1 (size1)

Selection

|  |  |
| --- | --- |
| Geometric entity level | Domain |
| Selection | Domain 1 |



Size 1

Settings

| **Description** | **Value** |
| --- | --- |
| Maximum element size | L/10 |
| Minimum element size | L/10 |
| Curvature factor | 0.3 |
| Curvature factor | Off |
| Resolution of narrow regions | Off |
| Maximum element growth rate | 1.3 |
| Maximum element growth rate | Off |
| Custom element size | Custom |

1. Study 1
   1. Stationary

Study settings

| **Description** | **Value** |
| --- | --- |
| Include geometric nonlinearity | Off |

Physics and variables selection

| **Physics interface** | **Discretization** |
| --- | --- |
| Unit Input (c) | physics |

Mesh selection

| **Geometry** | **Mesh** |
| --- | --- |
| Geometry 1 (geom1) | mesh1 |

* 1. Solver Configurations
     1. Solver 1

#### Compile Equations: Stationary (st1)

Study and step

| **Description** | **Value** |
| --- | --- |
| Use study | Study 1 |
| Use study step | Stationary |

#### Dependent Variables 1 (v1)

General

| **Description** | **Value** |
| --- | --- |
| Defined by study step | Stationary |
| Constant |  |

Initial values of variables solved for

| **Description** | **Value** |
| --- | --- |
| Solution | Zero |

Values of variables not solved for

| **Description** | **Value** |
| --- | --- |
| Solution | Zero |

##### Dependent variable av0 (comp1.av0) (comp1\_av0)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.av0 |
| Solve for this field | Off |

##### Dependent variable av1 (comp1.av1) (comp1\_av1)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.av1 |
| Solve for this field | Off |

##### Dependent variable atu0 (comp1.atu0) (comp1\_atu0)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.atu0 |
| Solve for this field | Off |

##### Dependent variable au3 (comp1.au3) (comp1\_au3)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.au3 |
| Solve for this field | Off |

##### Dependent variable au2 (comp1.au2) (comp1\_au2)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.au2 |
| Solve for this field | Off |

##### Dependent variable au1 (comp1.au1) (comp1\_au1)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.au1 |
| Solve for this field | Off |

##### Dependent variable atu3 (comp1.atu3) (comp1\_atu3)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.atu3 |
| Solve for this field | Off |

##### Dependent variable atu1 (comp1.atu1) (comp1\_atu1)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.atu1 |
| Solve for this field | Off |

##### Dependent variable atu2 (comp1.atu2) (comp1\_atu2)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.atu2 |
| Solve for this field | Off |

##### Dependent variable btu1 (comp1.btu1) (comp1\_btu1)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.btu1 |
| Solve for this field | Off |

##### Dependent variable bu3 (comp1.bu3) (comp1\_bu3)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.bu3 |
| Solve for this field | Off |

##### Dependent variable bu2 (comp1.bu2) (comp1\_bu2)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.bu2 |
| Solve for this field | Off |

##### Dependent variable btu3 (comp1.btu3) (comp1\_btu3)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.btu3 |
| Solve for this field | Off |

##### Dependent variable bu1 (comp1.bu1) (comp1\_bu1)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.bu1 |
| Solve for this field | Off |

##### Dependent variable btu2 (comp1.btu2) (comp1\_btu2)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.btu2 |
| Solve for this field | Off |

##### Dependent variable Xv (comp1.Xv) (comp1\_Xv)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.Xv |

##### Dependent variable Xu (comp1.Xu) (comp1\_Xu)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.Xu |

##### Dependent variable au0 (comp1.au0) (comp1\_au0)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.au0 |
| Solve for this field | Off |

##### Dependent variable av3 (comp1.av3) (comp1\_av3)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.av3 |
| Solve for this field | Off |

##### Dependent variable av2 (comp1.av2) (comp1\_av2)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.av2 |
| Solve for this field | Off |

##### Dependent variable u (comp1.u) (comp1\_u)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.u |
| Solve for this field | Off |

##### Dependent variable bv2 (comp1.bv2) (comp1\_bv2)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.bv2 |
| Solve for this field | Off |

##### Dependent variable v (comp1.v) (comp1\_v)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.v |
| Solve for this field | Off |

##### Dependent variable bv1 (comp1.bv1) (comp1\_bv1)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.bv1 |
| Solve for this field | Off |

##### Dependent variable bv3 (comp1.bv3) (comp1\_bv3)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.bv3 |
| Solve for this field | Off |

##### Dependent variable au4 (comp1.au4) (comp1\_au4)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.au4 |
| Solve for this field | Off |
| Field name | comp1\_u2 |

##### Dependent variable au5 (comp1.au5) (comp1\_au5)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.au5 |
| Solve for this field | Off |
| Field name | comp1\_u3 |

##### Dependent variable btu4 (comp1.btu4) (comp1\_btu4)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.btu4 |
| Solve for this field | Off |
| Field name | comp1\_ab46 |

##### Dependent variable av4 (comp1.av4) (comp1\_av4)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.av4 |
| Solve for this field | Off |
| Field name | comp1\_ab43 |

##### Dependent variable bu4 (comp1.bu4) (comp1\_bu4)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.bu4 |
| Solve for this field | Off |
| Field name | comp1\_ab42 |

##### Dependent variable atu4 (comp1.atu4) (comp1\_atu4)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.atu4 |
| Solve for this field | Off |
| Field name | comp1\_ab45 |

##### Dependent variable bv4 (comp1.bv4) (comp1\_bv4)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.bv4 |
| Solve for this field | Off |
| Field name | comp1\_ab44 |

##### Dependent variable av5 (comp1.av5) (comp1\_av5)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.av5 |
| Solve for this field | Off |
| Field name | comp1\_u33 |

##### Dependent variable bv5 (comp1.bv5) (comp1\_bv5)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.bv5 |
| Solve for this field | Off |
| Field name | comp1\_u34 |

##### Dependent variable atu5 (comp1.atu5) (comp1\_atu5)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.atu5 |
| Solve for this field | Off |
| Field name | comp1\_u35 |

##### Dependent variable btu5 (comp1.btu5) (comp1\_btu5)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.btu5 |
| Solve for this field | Off |
| Field name | comp1\_u36 |

##### Dependent variable bu5 (comp1.bu5) (comp1\_bu5)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.bu5 |
| Solve for this field | Off |
| Field name | comp1\_u32 |

#### Stationary Solver 1 (s1)

General

| **Description** | **Value** |
| --- | --- |
| Defined by study step | Stationary |
| Relative tolerance | 0.000010 |

Log

| **Description** | **Value** |
| --- | --- |
| Constant |  |

##### Fully Coupled 1 (fc1)

General

| **Description** | **Value** |
| --- | --- |
| Linear solver | Direct |

1. Study 2
   1. Stationary

Study settings

| **Description** | **Value** |
| --- | --- |
| Include geometric nonlinearity | Off |

Physics and variables selection

| **Physics interface** | **Discretization** |
| --- | --- |
| Fourier coefficients 0 (c2) | physics |
| Fourier coefficients 1 (c3) | physics |
| Fourier coefficients 2 (c4) | physics |
| Fourier coefficients 3 (phys1) | physics |
| Fourier coefficients 4 (phys2) | physics |
| Fourier coefficients 5 (phys3) | physics |

Mesh selection

| **Geometry** | **Mesh** |
| --- | --- |
| Geometry 1 (geom1) | mesh1 |

* 1. Solver Configurations
     1. Solver 2

#### Compile Equations: Stationary (st1)

Study and step

| **Description** | **Value** |
| --- | --- |
| Use study | Study 2 |
| Use study step | Stationary |

#### Dependent Variables 1 (v1)

General

| **Description** | **Value** |
| --- | --- |
| Defined by study step | Stationary |
| Constant |  |

Initial values of variables solved for

| **Description** | **Value** |
| --- | --- |
| Solution | Zero |

Values of variables not solved for

| **Description** | **Value** |
| --- | --- |
| Method | Solution |
| Solution | Solver 1 |

##### Dependent variable av0 (comp1.av0) (comp1\_av0)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.av0 |

##### Dependent variable av1 (comp1.av1) (comp1\_av1)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.av1 |

##### Dependent variable atu0 (comp1.atu0) (comp1\_atu0)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.atu0 |

##### Dependent variable au3 (comp1.au3) (comp1\_au3)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.au3 |

##### Dependent variable au2 (comp1.au2) (comp1\_au2)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.au2 |

##### Dependent variable au1 (comp1.au1) (comp1\_au1)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.au1 |

##### Dependent variable atu3 (comp1.atu3) (comp1\_atu3)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.atu3 |

##### Dependent variable atu1 (comp1.atu1) (comp1\_atu1)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.atu1 |

##### Dependent variable atu2 (comp1.atu2) (comp1\_atu2)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.atu2 |

##### Dependent variable btu1 (comp1.btu1) (comp1\_btu1)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.btu1 |

##### Dependent variable bu3 (comp1.bu3) (comp1\_bu3)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.bu3 |

##### Dependent variable bu2 (comp1.bu2) (comp1\_bu2)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.bu2 |

##### Dependent variable btu3 (comp1.btu3) (comp1\_btu3)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.btu3 |

##### Dependent variable bu1 (comp1.bu1) (comp1\_bu1)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.bu1 |

##### Dependent variable btu2 (comp1.btu2) (comp1\_btu2)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.btu2 |

##### Dependent variable Xv (comp1.Xv) (comp1\_Xv)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.Xv |
| Solve for this field | Off |

##### Dependent variable Xu (comp1.Xu) (comp1\_Xu)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.Xu |
| Solve for this field | Off |

##### Dependent variable au0 (comp1.au0) (comp1\_au0)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.au0 |

##### Dependent variable av3 (comp1.av3) (comp1\_av3)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.av3 |

##### Dependent variable av2 (comp1.av2) (comp1\_av2)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.av2 |

##### Dependent variable u (comp1.u) (comp1\_u)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.u |
| Solve for this field | Off |

##### Dependent variable bv2 (comp1.bv2) (comp1\_bv2)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.bv2 |

##### Dependent variable v (comp1.v) (comp1\_v)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.v |
| Solve for this field | Off |

##### Dependent variable bv1 (comp1.bv1) (comp1\_bv1)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.bv1 |

##### Dependent variable bv3 (comp1.bv3) (comp1\_bv3)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.bv3 |

##### Dependent variable au4 (comp1.au4) (comp1\_au4)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.au4 |
| Field name | comp1\_u2 |

##### Dependent variable au5 (comp1.au5) (comp1\_au5)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.au5 |
| Field name | comp1\_u3 |

##### Dependent variable btu4 (comp1.btu4) (comp1\_btu4)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.btu4 |
| Field name | comp1\_ab46 |

##### Dependent variable av4 (comp1.av4) (comp1\_av4)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.av4 |
| Field name | comp1\_ab43 |

##### Dependent variable bu4 (comp1.bu4) (comp1\_bu4)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.bu4 |
| Field name | comp1\_ab42 |

##### Dependent variable atu4 (comp1.atu4) (comp1\_atu4)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.atu4 |
| Field name | comp1\_ab45 |

##### Dependent variable bv4 (comp1.bv4) (comp1\_bv4)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.bv4 |
| Field name | comp1\_ab44 |

##### Dependent variable av5 (comp1.av5) (comp1\_av5)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.av5 |
| Field name | comp1\_u33 |

##### Dependent variable bv5 (comp1.bv5) (comp1\_bv5)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.bv5 |
| Field name | comp1\_u34 |

##### Dependent variable atu5 (comp1.atu5) (comp1\_atu5)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.atu5 |
| Field name | comp1\_u35 |

##### Dependent variable btu5 (comp1.btu5) (comp1\_btu5)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.btu5 |
| Field name | comp1\_u36 |

##### Dependent variable bu5 (comp1.bu5) (comp1\_bu5)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.bu5 |
| Field name | comp1\_u32 |

#### Stationary Solver 1 (s1)

General

| **Description** | **Value** |
| --- | --- |
| Defined by study step | Stationary |
| Relative tolerance | 0.000010 |

Log

| **Description** | **Value** |
| --- | --- |
| Constant |  |

##### Fully Coupled 1 (fc1)

General

| **Description** | **Value** |
| --- | --- |
| Linear solver | Direct |

1. Study 3
   1. Time Dependent

Study settings

| **Description** | **Value** |
| --- | --- |
| Include geometric nonlinearity | Off |

| **Times** | **Unit** |
| --- | --- |
| range(0,0.1,20) | s |

Physics and variables selection

| **Physics interface** | **Discretization** |
| --- | --- |
| Closed loop system (c5) | physics |

Mesh selection

| **Geometry** | **Mesh** |
| --- | --- |
| Geometry 1 (geom1) | mesh1 |

* 1. Solver Configurations
     1. Solver 3

#### Compile Equations: Time Dependent (st1)

Study and step

| **Description** | **Value** |
| --- | --- |
| Use study | Study 3 |
| Use study step | Time Dependent |

#### Dependent Variables 1 (v1)

General

| **Description** | **Value** |
| --- | --- |
| Defined by study step | Time Dependent |
| Constant |  |

Initial values of variables solved for

| **Description** | **Value** |
| --- | --- |
| Solution | Zero |

Values of variables not solved for

| **Description** | **Value** |
| --- | --- |
| Method | Solution |
| Solution | Solver 2 |

##### Dependent variable Xv (comp1.Xv) (comp1\_Xv)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.Xv |
| Solve for this field | Off |

##### Dependent variable Xu (comp1.Xu) (comp1\_Xu)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.Xu |
| Solve for this field | Off |

##### Dependent variable au0 (comp1.au0) (comp1\_au0)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.au0 |
| Solve for this field | Off |

##### Dependent variable av0 (comp1.av0) (comp1\_av0)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.av0 |
| Solve for this field | Off |

##### Dependent variable av1 (comp1.av1) (comp1\_av1)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.av1 |
| Solve for this field | Off |

##### Dependent variable av2 (comp1.av2) (comp1\_av2)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.av2 |
| Solve for this field | Off |

##### Dependent variable atu0 (comp1.atu0) (comp1\_atu0)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.atu0 |
| Solve for this field | Off |

##### Dependent variable au2 (comp1.au2) (comp1\_au2)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.au2 |
| Solve for this field | Off |

##### Dependent variable au1 (comp1.au1) (comp1\_au1)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.au1 |
| Solve for this field | Off |

##### Dependent variable atu1 (comp1.atu1) (comp1\_atu1)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.atu1 |
| Solve for this field | Off |

##### Dependent variable atu2 (comp1.atu2) (comp1\_atu2)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.atu2 |
| Solve for this field | Off |

##### Dependent variable btu1 (comp1.btu1) (comp1\_btu1)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.btu1 |
| Solve for this field | Off |

##### Dependent variable u (comp1.u) (comp1\_u)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.u |

##### Dependent variable bv2 (comp1.bv2) (comp1\_bv2)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.bv2 |
| Solve for this field | Off |

##### Dependent variable v (comp1.v) (comp1\_v)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.v |

##### Dependent variable bu2 (comp1.bu2) (comp1\_bu2)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.bu2 |
| Solve for this field | Off |

##### Dependent variable bv1 (comp1.bv1) (comp1\_bv1)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.bv1 |
| Solve for this field | Off |

##### Dependent variable bu1 (comp1.bu1) (comp1\_bu1)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.bu1 |
| Solve for this field | Off |

##### Dependent variable btu2 (comp1.btu2) (comp1\_btu2)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.btu2 |
| Solve for this field | Off |

##### Dependent variable au3 (comp1.au3) (comp1\_au3)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.au3 |
| Solve for this field | Off |
| Field name | comp1\_u2 |

##### Dependent variable bv3 (comp1.bv3) (comp1\_bv3)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.bv3 |
| Solve for this field | Off |
| Field name | comp1\_ab34 |

##### Dependent variable av3 (comp1.av3) (comp1\_av3)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.av3 |
| Solve for this field | Off |
| Field name | comp1\_ab33 |

##### Dependent variable bu3 (comp1.bu3) (comp1\_bu3)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.bu3 |
| Solve for this field | Off |
| Field name | comp1\_ab32 |

##### Dependent variable atu3 (comp1.atu3) (comp1\_atu3)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.atu3 |
| Solve for this field | Off |
| Field name | comp1\_ab35 |

##### Dependent variable btu3 (comp1.btu3) (comp1\_btu3)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.btu3 |
| Solve for this field | Off |
| Field name | comp1\_ab36 |

##### Dependent variable au4 (comp1.au4) (comp1\_au4)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.au4 |
| Solve for this field | Off |
| Field name | comp1\_u2 |

##### Dependent variable au5 (comp1.au5) (comp1\_au5)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.au5 |
| Solve for this field | Off |
| Field name | comp1\_u3 |

##### Dependent variable btu4 (comp1.btu4) (comp1\_btu4)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.btu4 |
| Solve for this field | Off |
| Field name | comp1\_ab46 |

##### Dependent variable av4 (comp1.av4) (comp1\_av4)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.av4 |
| Solve for this field | Off |
| Field name | comp1\_ab43 |

##### Dependent variable bu4 (comp1.bu4) (comp1\_bu4)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.bu4 |
| Solve for this field | Off |
| Field name | comp1\_ab42 |

##### Dependent variable atu4 (comp1.atu4) (comp1\_atu4)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.atu4 |
| Solve for this field | Off |
| Field name | comp1\_ab45 |

##### Dependent variable bv4 (comp1.bv4) (comp1\_bv4)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.bv4 |
| Solve for this field | Off |
| Field name | comp1\_ab44 |

##### Dependent variable av5 (comp1.av5) (comp1\_av5)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.av5 |
| Solve for this field | Off |
| Field name | comp1\_u33 |

##### Dependent variable bv5 (comp1.bv5) (comp1\_bv5)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.bv5 |
| Solve for this field | Off |
| Field name | comp1\_u34 |

##### Dependent variable atu5 (comp1.atu5) (comp1\_atu5)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.atu5 |
| Solve for this field | Off |
| Field name | comp1\_u35 |

##### Dependent variable btu5 (comp1.btu5) (comp1\_btu5)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.btu5 |
| Solve for this field | Off |
| Field name | comp1\_u36 |

##### Dependent variable bu5 (comp1.bu5) (comp1\_bu5)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.bu5 |
| Solve for this field | Off |
| Field name | comp1\_u32 |

#### Time-Dependent Solver 1 (t1)

General

| **Description** | **Value** |
| --- | --- |
| Defined by study step | Time Dependent |
| Time | {0, 0.1, 0.2, 0.30000000000000004, 0.4, 0.5, 0.6000000000000001, 0.7000000000000001, 0.8, 0.9, 1, 1.1, 1.2000000000000002, 1.3, 1.4000000000000001, 1.5, 1.6, 1.7000000000000002, 1.8, 1.9000000000000001, 2, 2.1, 2.2, 2.3000000000000003, 2.4000000000000004, 2.5, 2.6, 2.7, 2.8000000000000003, 2.9000000000000004, 3, 3.1, 3.2, 3.3000000000000003, 3.4000000000000004, 3.5, 3.6, 3.7, 3.8000000000000003, 3.9000000000000004, 4, 4.1000000000000005, 4.2, 4.3, 4.4, 4.5, 4.6000000000000005, 4.7, 4.800000000000001, 4.9, 5, 5.1000000000000005, 5.2, 5.300000000000001, 5.4, 5.5, 5.6000000000000005, 5.7, 5.800000000000001, 5.9, 6, 6.1000000000000005, 6.2, 6.300000000000001, 6.4, 6.5, 6.6000000000000005, 6.7, 6.800000000000001, 6.9, 7, 7.1000000000000005, 7.2, 7.300000000000001, 7.4, 7.5, 7.6000000000000005, 7.7, 7.800000000000001, 7.9, 8, 8.1, 8.200000000000001, 8.3, 8.4, 8.5, 8.6, 8.700000000000001, 8.8, 8.9, 9, 9.1, 9.200000000000001, 9.3, 9.4, 9.5, 9.600000000000001, 9.700000000000001, 9.8, 9.9, 10, 10.100000000000001, 10.200000000000001, 10.3, 10.4, 10.5, 10.600000000000001, 10.700000000000001, 10.8, 10.9, 11, 11.100000000000001, 11.200000000000001, 11.3, 11.4, 11.5, 11.600000000000001, 11.700000000000001, 11.8, 11.9, 12, 12.100000000000001, 12.200000000000001, 12.3, 12.4, 12.5, 12.600000000000001, 12.700000000000001, 12.8, 12.9, 13, 13.100000000000001, 13.200000000000001, 13.3, 13.4, 13.5, 13.600000000000001, 13.700000000000001, 13.8, 13.9, 14, 14.100000000000001, 14.200000000000001, 14.3, 14.4, 14.5, 14.600000000000001, 14.700000000000001, 14.8, 14.9, 15, 15.100000000000001, 15.200000000000001, 15.3, 15.4, 15.5, 15.600000000000001, 15.700000000000001, 15.8, 15.9, 16, 16.1, 16.2, 16.3, 16.400000000000002, 16.5, 16.6, 16.7, 16.8, 16.900000000000002, 17, 17.1, 17.2, 17.3, 17.400000000000002, 17.5, 17.6, 17.7, 17.8, 17.900000000000002, 18, 18.1, 18.2, 18.3, 18.400000000000002, 18.5, 18.6, 18.7, 18.8, 18.900000000000002, 19, 19.1, 19.200000000000003, 19.3, 19.400000000000002, 19.5, 19.6, 19.700000000000003, 19.8, 19.900000000000002, 20} |
| Relative tolerance | 0.0001 |

Absolute tolerance

| **Description** | **Value** |
| --- | --- |
| Tolerance | 0.000010 |

Time stepping

| **Description** | **Value** |
| --- | --- |
| Initial step | 0.0010 |

Advanced

| **Description** | **Value** |
| --- | --- |
| Fraction of initial step for Backward Euler | 0.0010 |

Log

| **Description** | **Value** |
| --- | --- |
| Constant |  |

##### Fully Coupled 1 (fc1)

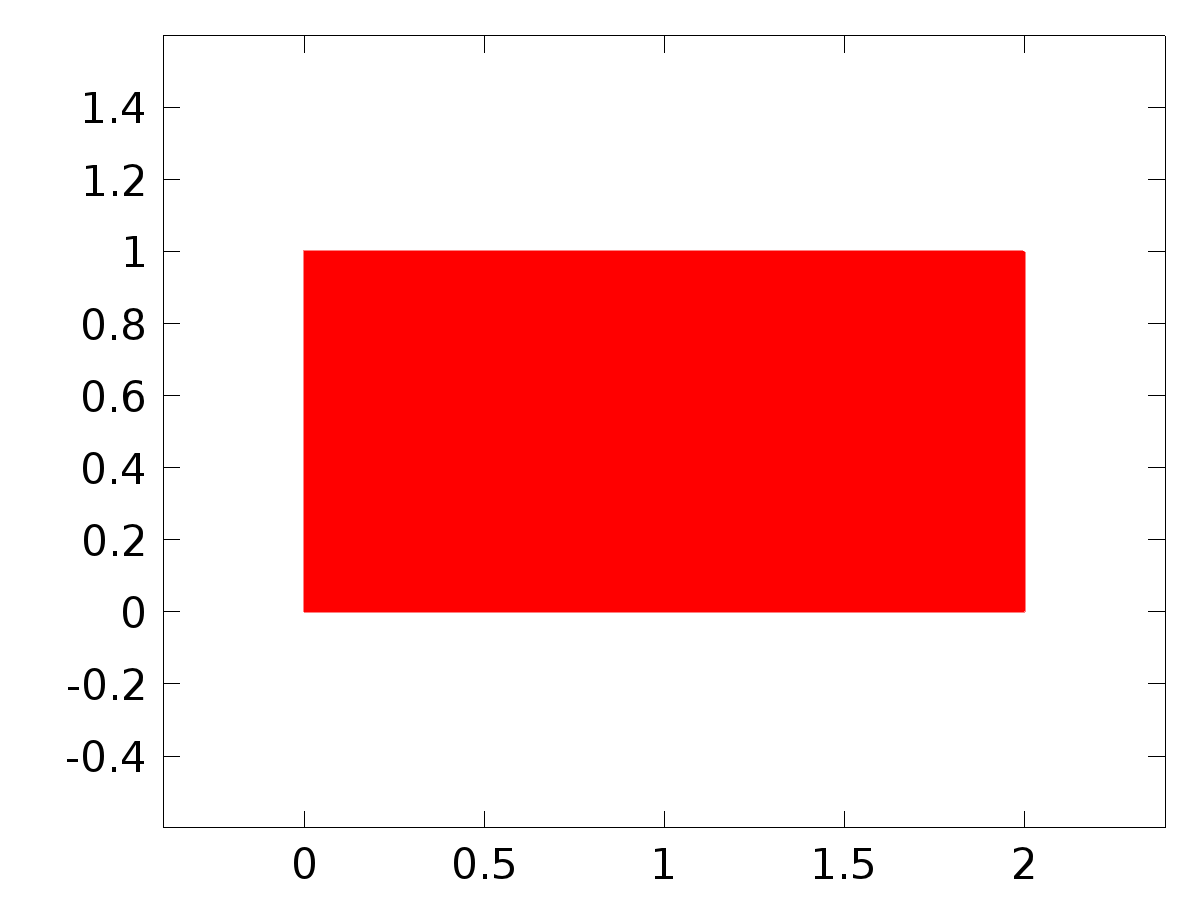
General

| **Description** | **Value** |
| --- | --- |
| Linear solver | Direct |

1. Results
   1. Data Sets
      1. Solution 1

Solution

| **Description** | **Value** |
| --- | --- |
| Solution | Solver 1 |
| Component | Save Point Geometry 1 |

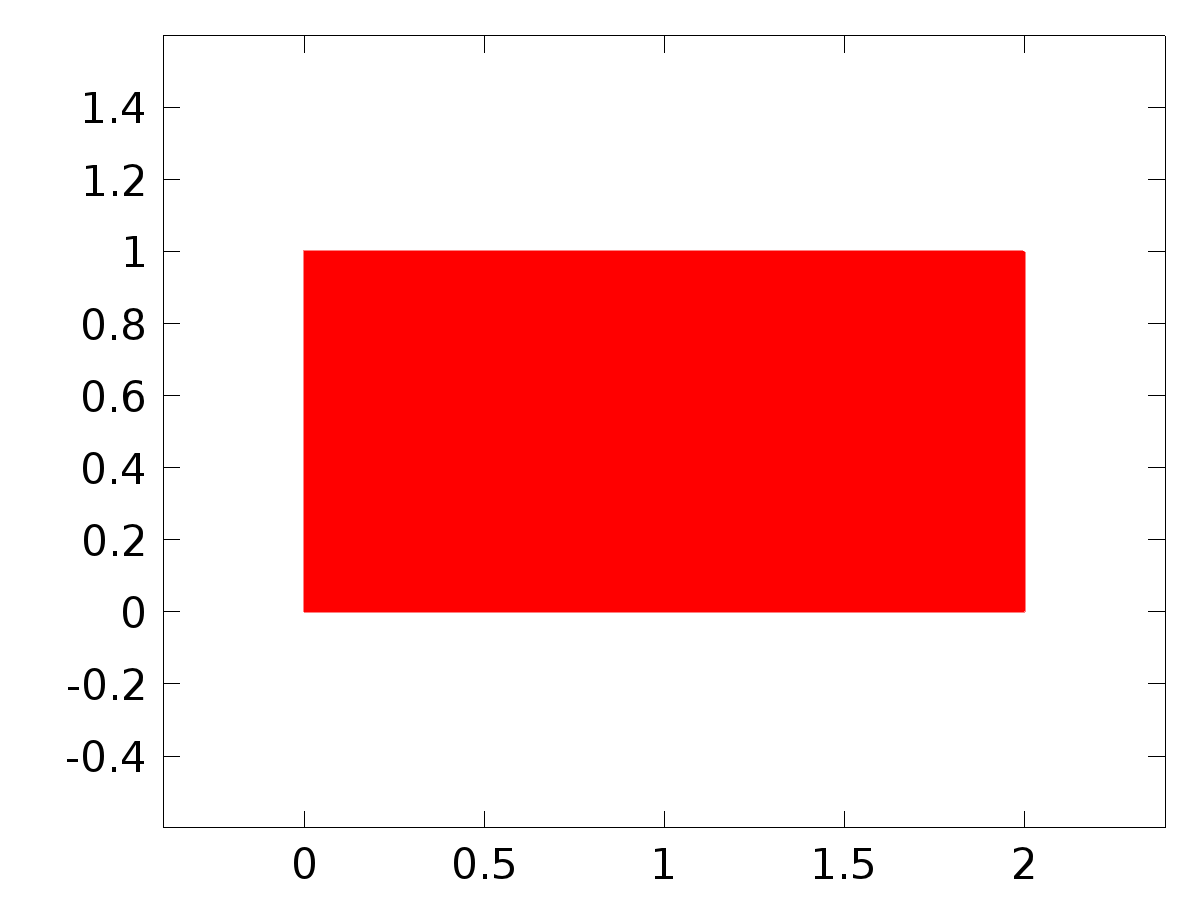


Data set: Solution 1

* + 1. Solution 2

Solution

| **Description** | **Value** |
| --- | --- |
| Solution | Solver 2 |
| Component | Save Point Geometry 1 |

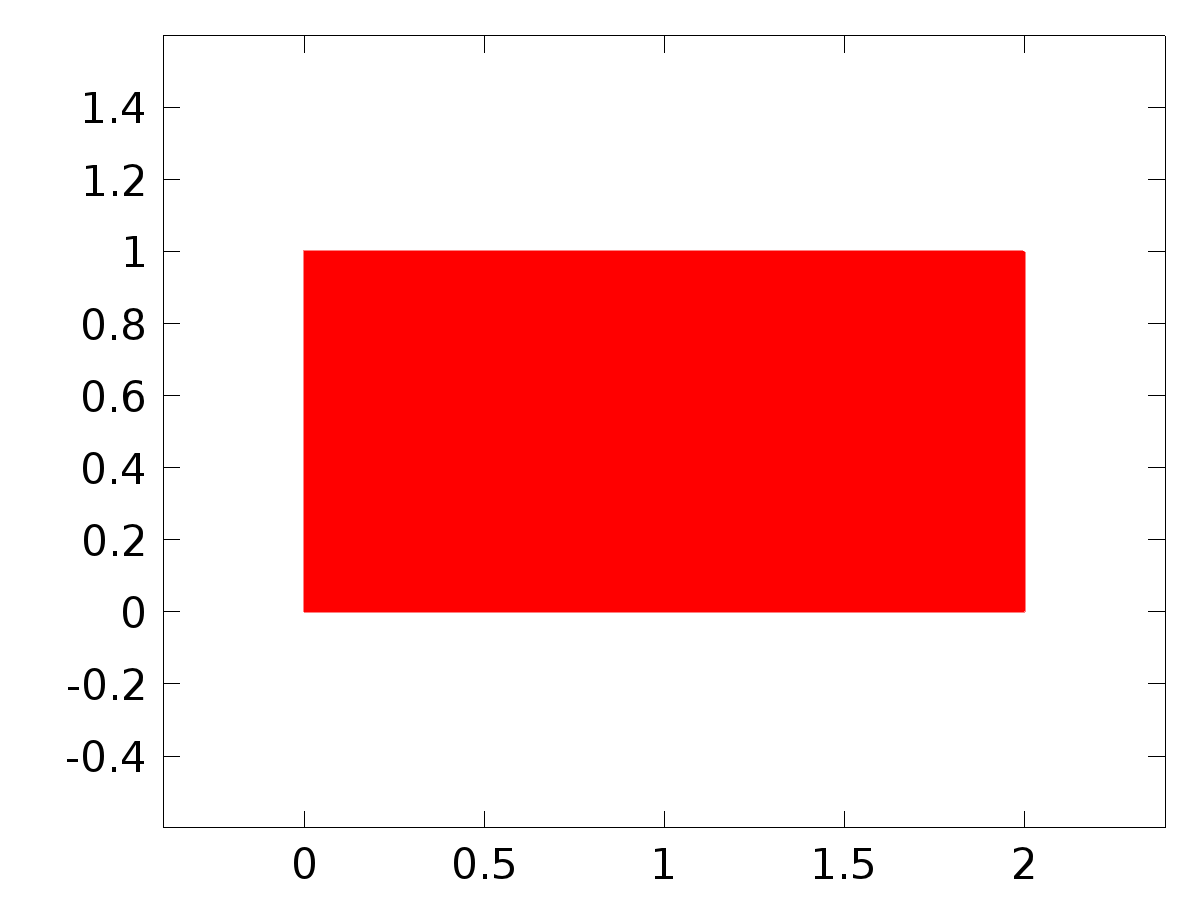


Data set: Solution 2

* + 1. Solution 3

Solution

| **Description** | **Value** |
| --- | --- |
| Solution | Solver 3 |
| Component | Save Point Geometry 1 |



Data set: Solution 3

* 1. Derived Values
     1. Global Evaluation 1

Data

| **Description** | **Value** |
| --- | --- |
| Data set | Solution 3 |

Expression

| **Description** | **Value** |
| --- | --- |
| Expression | e |

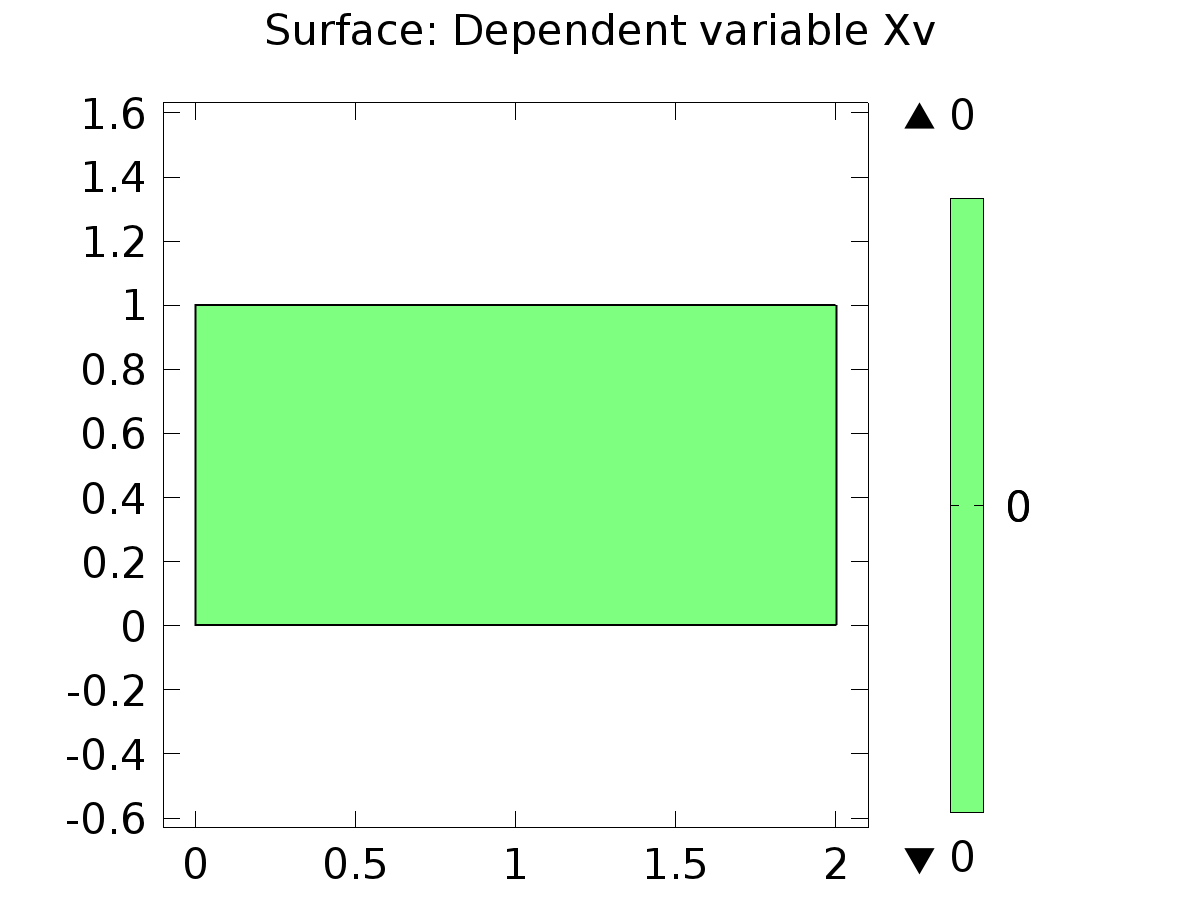
* 1. Tables
     1. Table 1

Global Evaluation 1 (G)

Table 1

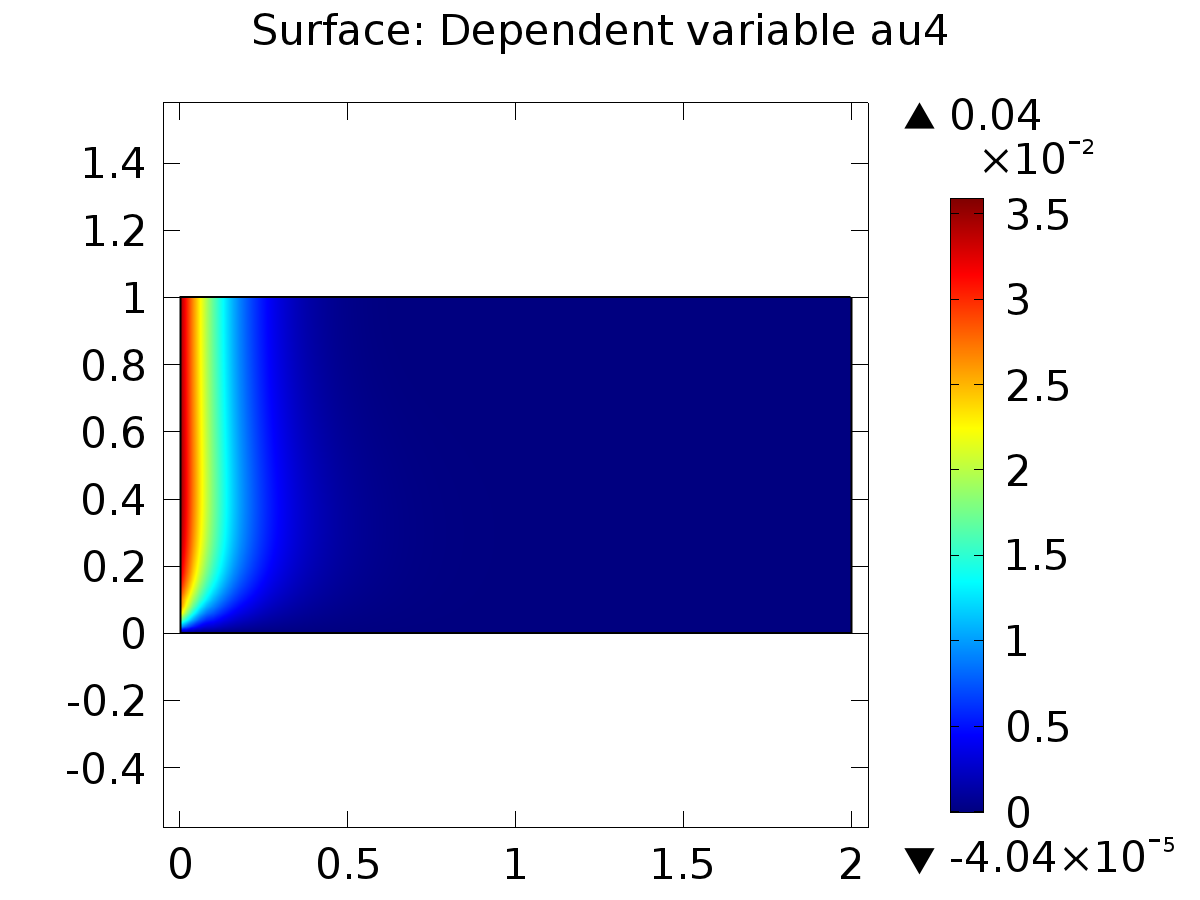
| **Time (s)** | **C(u)** | **yr** | **gamma** | **d** | **e** |
| --- | --- | --- | --- | --- | --- |
| 0.0000 | -2.1473E-19 | 0.10000 | 13.339 | 0.20000 | 0.10000 |
| 0.10000 | 9.3710E-6 | 0.11997 | 13.852 | 0.20998 | 0.11996 |
| 0.20000 | 0.0024680 | 0.13973 | 14.293 | 0.21987 | 0.13727 |
| 0.30000 | 0.017047 | 0.15910 | 14.676 | 0.22955 | 0.14206 |
| 0.40000 | 0.045327 | 0.17788 | 15.009 | 0.23894 | 0.13256 |
| 0.50000 | 0.081112 | 0.19589 | 15.298 | 0.24794 | 0.11477 |
| 0.60000 | 0.11839 | 0.21293 | 15.542 | 0.25646 | 0.094537 |
| 0.70000 | 0.15352 | 0.22884 | 15.738 | 0.26442 | 0.075328 |
| 0.80000 | 0.18478 | 0.24347 | 15.878 | 0.27174 | 0.058687 |
| 0.90000 | 0.21168 | 0.25667 | 15.953 | 0.27833 | 0.044981 |
| 1.0000 | 0.23429 | 0.26829 | 15.958 | 0.28415 | 0.034004 |
| 1.1000 | 0.25289 | 0.27824 | 15.891 | 0.28912 | 0.025349 |
| 1.2000 | 0.26780 | 0.28641 | 15.752 | 0.29320 | 0.018605 |
| 1.3000 | 0.27927 | 0.29271 | 15.549 | 0.29636 | 0.013439 |
| 1.4000 | 0.28750 | 0.29709 | 15.286 | 0.29854 | 0.0095886 |
| 1.5000 | 0.29267 | 0.29950 | 14.969 | 0.29975 | 0.0068278 |
| 1.6000 | 0.29497 | 0.29991 | 14.600 | 0.29996 | 0.0049481 |
| 1.7000 | 0.29459 | 0.29833 | 14.174 | 0.29917 | 0.0037382 |
| 1.8000 | 0.29179 | 0.29477 | 13.684 | 0.29738 | 0.0029761 |
| 1.9000 | 0.28681 | 0.28926 | 13.117 | 0.29463 | 0.0024488 |
| 2.0000 | 0.27986 | 0.28186 | 12.461 | 0.29093 | 0.0019954 |
| 2.1000 | 0.27111 | 0.27264 | 11.706 | 0.28632 | 0.0015319 |
| 2.2000 | 0.26065 | 0.26170 | 10.843 | 0.28085 | 0.0010450 |
| 2.3000 | 0.24857 | 0.24914 | 9.8712 | 0.27457 | 5.7053E-4 |
| 2.4000 | 0.23492 | 0.23509 | 8.7914 | 0.26755 | 1.7226E-4 |
| 2.5000 | 0.21978 | 0.21969 | 7.6066 | 0.25985 | -8.6247E-5 |
| 2.6000 | 0.20327 | 0.20310 | 6.3178 | 0.25155 | -1.7323E-4 |
| 2.7000 | 0.18558 | 0.18548 | 4.9214 | 0.24274 | -1.0763E-4 |
| 2.8000 | 0.16695 | 0.16700 | 3.4075 | 0.23350 | 4.7999E-5 |
| 2.9000 | 0.14764 | 0.14785 | 1.7602 | 0.22392 | 2.1372E-4 |
| 3.0000 | 0.12790 | 0.12822 | -0.038371 | 0.21411 | 3.2093E-4 |
| 3.1000 | 0.10798 | 0.10832 | -2.0021 | 0.20416 | 3.3302E-4 |
| 3.2000 | 0.088074 | 0.088325 | -4.1329 | 0.19416 | 2.5126E-4 |
| 3.3000 | 0.068341 | 0.068451 | -6.4128 | 0.18423 | 1.1025E-4 |
| 3.4000 | 0.048931 | 0.048892 | -8.7977 | 0.17445 | -3.9040E-5 |
| 3.5000 | 0.029991 | 0.029843 | -11.214 | 0.16492 | -1.4778E-4 |
| 3.6000 | 0.011685 | 0.011496 | -13.561 | 0.15575 | -1.8904E-4 |
| 3.7000 | -0.0058082 | -0.0059672 | -15.716 | 0.14702 | -1.5905E-4 |
| 3.8000 | -0.022294 | -0.022372 | -17.550 | 0.13881 | -7.7806E-5 |
| 3.9000 | -0.037570 | -0.037553 | -18.938 | 0.13122 | 1.7266E-5 |
| 4.0000 | -0.051451 | -0.051360 | -19.776 | 0.12432 | 9.0724E-5 |
| 4.1000 | -0.063776 | -0.063655 | -19.995 | 0.11817 | 1.2097E-4 |
| 4.2000 | -0.074416 | -0.074315 | -19.571 | 0.11284 | 1.0107E-4 |
| 4.3000 | -0.083276 | -0.083233 | -18.528 | 0.10838 | 4.2442E-5 |
| 4.4000 | -0.090291 | -0.090320 | -16.937 | 0.10484 | -2.9563E-5 |
| 4.5000 | -0.095418 | -0.095506 | -14.904 | 0.10225 | -8.8274E-5 |
| 4.6000 | -0.098626 | -0.098738 | -12.560 | 0.10063 | -1.1234E-4 |
| 4.7000 | -0.099892 | -0.099985 | -10.042 | 0.10001 | -9.2931E-5 |
| 4.8000 | -0.099201 | -0.099233 | -7.4812 | 0.10038 | -3.1450E-5 |
| 4.9000 | -0.096545 | -0.096491 | -4.9865 | 0.10175 | 5.3988E-5 |
| 5.0000 | -0.091917 | -0.091785 | -2.6382 | 0.10411 | 1.3206E-4 |
| 5.1000 | -0.085336 | -0.085163 | -0.48437 | 0.10742 | 1.7325E-4 |
| 5.2000 | -0.076844 | -0.076691 | 1.4571 | 0.11165 | 1.5270E-4 |
| 5.3000 | -0.066522 | -0.066453 | 3.1921 | 0.11677 | 6.8839E-5 |
| 5.4000 | -0.054502 | -0.054553 | 4.7420 | 0.12272 | -5.0898E-5 |
| 5.5000 | -0.040942 | -0.041108 | 6.1344 | 0.12945 | -1.6604E-4 |
| 5.6000 | -0.026016 | -0.026253 | 7.3956 | 0.13687 | -2.3734E-4 |
| 5.7000 | -0.0099040 | -0.010137 | 8.5457 | 0.14493 | -2.3307E-4 |
| 5.8000 | 0.0072218 | 0.0070796 | 9.5965 | 0.15354 | -1.4220E-4 |
| 5.9000 | 0.025209 | 0.025225 | 10.552 | 0.16261 | 1.5612E-5 |
| 6.0000 | 0.043926 | 0.044117 | 11.414 | 0.17206 | 1.9073E-4 |
| 6.1000 | 0.063248 | 0.063567 | 12.179 | 0.18178 | 3.1917E-4 |
| 6.2000 | 0.083033 | 0.083382 | 12.850 | 0.19169 | 3.4893E-4 |
| 6.3000 | 0.10310 | 0.10336 | 13.430 | 0.20168 | 2.5865E-4 |
| 6.4000 | 0.12324 | 0.12331 | 13.930 | 0.21165 | 6.8197E-5 |
| 6.5000 | 0.14319 | 0.14302 | 14.362 | 0.22151 | -1.6372E-4 |
| 6.6000 | 0.16267 | 0.16231 | 14.735 | 0.23115 | -3.5897E-4 |
| 6.7000 | 0.18141 | 0.18097 | 15.061 | 0.24048 | -4.4317E-4 |
| 6.8000 | 0.19920 | 0.19882 | 15.342 | 0.24941 | -3.7844E-4 |
| 6.9000 | 0.21586 | 0.21569 | 15.579 | 0.25784 | -1.7681E-4 |
| 7.0000 | 0.23130 | 0.23140 | 15.766 | 0.26570 | 9.6157E-5 |
| 7.1000 | 0.24545 | 0.24579 | 15.895 | 0.27290 | 3.4616E-4 |
| 7.2000 | 0.25824 | 0.25873 | 15.959 | 0.27937 | 4.8998E-4 |
| 7.3000 | 0.26962 | 0.27009 | 15.952 | 0.28504 | 4.7039E-4 |
| 7.4000 | 0.27946 | 0.27974 | 15.872 | 0.28987 | 2.8131E-4 |
| 7.5000 | 0.28761 | 0.28760 | 15.723 | 0.29380 | -1.0421E-5 |
| 7.6000 | 0.29387 | 0.29358 | 15.509 | 0.29679 | -2.8800E-4 |
| 7.7000 | 0.29811 | 0.29763 | 15.237 | 0.29882 | -4.7516E-4 |
| 7.8000 | 0.30023 | 0.29971 | 14.911 | 0.29985 | -5.2418E-4 |
| 7.9000 | 0.30017 | 0.29979 | 14.532 | 0.29989 | -3.8662E-4 |
| 8.0000 | 0.29799 | 0.29787 | 14.096 | 0.29894 | -1.1423E-4 |
| 8.1000 | 0.29378 | 0.29398 | 13.594 | 0.29699 | 1.9373E-4 |
| 8.2000 | 0.28772 | 0.28815 | 13.013 | 0.29407 | 4.2240E-4 |
| 8.3000 | 0.27993 | 0.28043 | 12.342 | 0.29022 | 5.0213E-4 |
| 8.4000 | 0.27050 | 0.27092 | 11.568 | 0.28546 | 4.2363E-4 |
| 8.5000 | 0.25948 | 0.25970 | 10.687 | 0.27985 | 2.1905E-4 |
| 8.6000 | 0.24692 | 0.24688 | 9.6971 | 0.27344 | -4.0789E-5 |
| 8.7000 | 0.23286 | 0.23259 | 8.5995 | 0.26630 | -2.6880E-4 |
| 8.8000 | 0.21738 | 0.21698 | 7.3971 | 0.25849 | -3.9572E-4 |
| 8.9000 | 0.20059 | 0.20020 | 6.0907 | 0.25010 | -3.8435E-4 |
| 9.0000 | 0.18268 | 0.18242 | 4.6755 | 0.24121 | -2.5330E-4 |
| 9.1000 | 0.16388 | 0.16382 | 3.1403 | 0.23191 | -5.6417E-5 |
| 9.2000 | 0.14444 | 0.14458 | 1.4688 | 0.22229 | 1.4023E-4 |
| 9.3000 | 0.12463 | 0.12489 | -0.35676 | 0.21245 | 2.6507E-4 |
| 9.4000 | 0.10467 | 0.10496 | -2.3489 | 0.20248 | 2.8095E-4 |
| 9.5000 | 0.084765 | 0.084970 | -4.5066 | 0.19248 | 2.0450E-4 |
| 9.6000 | 0.065064 | 0.065135 | -6.8081 | 0.18257 | 7.1105E-5 |
| 9.7000 | 0.045716 | 0.045648 | -9.2042 | 0.17282 | -6.8318E-5 |
| 9.8000 | 0.026870 | 0.026704 | -11.616 | 0.16335 | -1.6570E-4 |
| 9.9000 | 0.0086860 | 0.0084928 | -13.940 | 0.15425 | -1.9320E-4 |
| 10.000 | -0.0086529 | -0.0088042 | -16.051 | 0.14560 | -1.5129E-4 |
| 10.100 | -0.024952 | -0.025014 | -17.818 | 0.13749 | -6.2597E-5 |
| 10.200 | -0.040011 | -0.039975 | -19.120 | 0.13001 | 3.5759E-5 |
| 10.300 | -0.053644 | -0.053537 | -19.857 | 0.12323 | 1.0686E-4 |
| 10.400 | -0.065696 | -0.065565 | -19.969 | 0.11722 | 1.3076E-4 |
| 10.500 | -0.076043 | -0.075939 | -19.438 | 0.11203 | 1.0378E-4 |
| 10.600 | -0.084594 | -0.084555 | -18.297 | 0.10772 | 3.8606E-5 |
| 10.700 | -0.091292 | -0.091327 | -16.623 | 0.10434 | -3.4905E-5 |
| 10.800 | -0.096098 | -0.096187 | -14.528 | 0.10191 | -8.8810E-5 |
| 10.900 | -0.098981 | -0.099087 | -12.145 | 0.10046 | -1.0620E-4 |
| 11.000 | -0.099918 | -0.099998 | -9.6113 | 0.10000 | -8.0212E-5 |
| 11.100 | -0.098896 | -0.098911 | -7.0545 | 0.10054 | -1.4391E-5 |
| 11.200 | -0.095905 | -0.095836 | -4.5797 | 0.10208 | 6.8954E-5 |
| 11.300 | -0.090944 | -0.090804 | -2.2616 | 0.10460 | 1.3997E-4 |
| 11.400 | -0.084036 | -0.083866 | -0.14298 | 0.10807 | 1.7022E-4 |
| 11.500 | -0.075229 | -0.075090 | 1.7628 | 0.11245 | 1.3828E-4 |
| 11.600 | -0.064619 | -0.064566 | 3.4649 | 0.11772 | 5.3256E-5 |
| 11.700 | -0.052332 | -0.052397 | 4.9864 | 0.12380 | -6.4514E-5 |
| 11.800 | -0.038528 | -0.038705 | 6.3550 | 0.13065 | -1.7706E-4 |
| 11.900 | -0.023383 | -0.023627 | 7.5963 | 0.13819 | -2.4440E-4 |
| 12.000 | -0.0070906 | -0.0073146 | 8.7291 | 0.14634 | -2.2397E-4 |
| 12.100 | 0.010191 | 0.010071 | 9.7638 | 0.15504 | -1.2073E-4 |
| 12.200 | 0.028312 | 0.028354 | 10.704 | 0.16418 | 4.1669E-5 |
| 12.300 | 0.047138 | 0.047354 | 11.549 | 0.17368 | 2.1603E-4 |
| 12.400 | 0.066545 | 0.066879 | 12.298 | 0.18344 | 3.3385E-4 |
| 12.500 | 0.086399 | 0.086736 | 12.953 | 0.19337 | 3.3630E-4 |
| 12.600 | 0.10651 | 0.10672 | 13.520 | 0.20336 | 2.1391E-4 |
| 12.700 | 0.12664 | 0.12665 | 14.007 | 0.21332 | 7.4875E-6 |
| 12.800 | 0.14652 | 0.14630 | 14.428 | 0.22315 | -2.1732E-4 |
| 12.900 | 0.16589 | 0.16549 | 14.793 | 0.23275 | -3.9502E-4 |
| 13.000 | 0.18449 | 0.18403 | 15.111 | 0.24202 | -4.5756E-4 |
| 13.100 | 0.20209 | 0.20173 | 15.385 | 0.25087 | -3.5748E-4 |
| 13.200 | 0.21855 | 0.21841 | 15.614 | 0.25921 | -1.3952E-4 |
| 13.300 | 0.23378 | 0.23391 | 15.792 | 0.26696 | 1.2978E-4 |
| 13.400 | 0.24770 | 0.24808 | 15.911 | 0.27404 | 3.7512E-4 |
| 13.500 | 0.26026 | 0.26076 | 15.963 | 0.28038 | 4.9384E-4 |
| 13.600 | 0.27141 | 0.27183 | 15.944 | 0.28592 | 4.2052E-4 |
| 13.700 | 0.28099 | 0.28119 | 15.852 | 0.29060 | 2.0342E-4 |
| 13.800 | 0.28881 | 0.28874 | 15.691 | 0.29437 | -7.2406E-5 |
| 13.900 | 0.29475 | 0.29440 | 15.467 | 0.29720 | -3.4717E-4 |
| 14.000 | 0.29865 | 0.29812 | 15.185 | 0.29906 | -5.2712E-4 |
| 14.100 | 0.30039 | 0.29986 | 14.851 | 0.29993 | -5.3176E-4 |
| 14.200 | 0.29996 | 0.29961 | 14.463 | 0.29980 | -3.5207E-4 |
| 14.300 | 0.29743 | 0.29735 | 14.017 | 0.29868 | -7.2088E-5 |
| 14.400 | 0.29291 | 0.29313 | 13.502 | 0.29657 | 2.1972E-4 |
| 14.500 | 0.28655 | 0.28698 | 12.907 | 0.29349 | 4.3154E-4 |
| 14.600 | 0.27850 | 0.27896 | 12.219 | 0.28948 | 4.6244E-4 |
| 14.700 | 0.26881 | 0.26915 | 11.428 | 0.28457 | 3.3785E-4 |
| 14.800 | 0.25752 | 0.25765 | 10.528 | 0.27883 | 1.3332E-4 |
| 14.900 | 0.24470 | 0.24458 | 9.5200 | 0.27229 | -1.1940E-4 |
| 15.000 | 0.23039 | 0.23006 | 8.4045 | 0.26503 | -3.3225E-4 |
| 15.100 | 0.21468 | 0.21424 | 7.1848 | 0.25712 | -4.4149E-4 |
| 15.200 | 0.19770 | 0.19728 | 5.8606 | 0.24864 | -4.2156E-4 |
| 15.300 | 0.17964 | 0.17935 | 4.4261 | 0.23967 | -2.8788E-4 |
| 15.400 | 0.16072 | 0.16062 | 2.8693 | 0.23031 | -9.7338E-5 |
| 15.500 | 0.14121 | 0.14129 | 1.1731 | 0.22065 | 7.9779E-5 |
| 15.600 | 0.12136 | 0.12155 | -0.67989 | 0.21078 | 1.9493E-4 |
| 15.700 | 0.10138 | 0.10159 | -2.7004 | 0.20080 | 2.1699E-4 |
| 15.800 | 0.081473 | 0.081619 | -4.8846 | 0.19081 | 1.4519E-4 |
| 15.900 | 0.061810 | 0.061828 | -7.2062 | 0.18091 | 1.8527E-5 |
| 16.000 | 0.042529 | 0.042419 | -9.6113 | 0.17121 | -1.0925E-4 |
| 16.100 | 0.023776 | 0.023586 | -12.017 | 0.16179 | -1.9065E-4 |
| 16.200 | 0.0057165 | 0.0055156 | -14.313 | 0.15276 | -2.0091E-4 |
| 16.300 | -0.011465 | -0.011610 | -16.375 | 0.14419 | -1.4572E-4 |
| 16.400 | -0.027570 | -0.027621 | -18.073 | 0.13619 | -5.1710E-5 |
| 16.500 | -0.042404 | -0.042357 | -19.285 | 0.12882 | 4.6541E-5 |
| 16.600 | -0.055787 | -0.055670 | -19.921 | 0.12216 | 1.1662E-4 |
| 16.700 | -0.067568 | -0.067428 | -19.924 | 0.11629 | 1.4007E-4 |
| 16.800 | -0.077628 | -0.077513 | -19.287 | 0.11124 | 1.1447E-4 |
| 16.900 | -0.085880 | -0.085825 | -18.050 | 0.10709 | 5.5011E-5 |
| 17.000 | -0.092267 | -0.092279 | -16.297 | 0.10386 | -1.2883E-5 |
| 17.100 | -0.096748 | -0.096813 | -14.144 | 0.10159 | -6.4761E-5 |
| 17.200 | -0.099303 | -0.099380 | -11.726 | 0.10031 | -7.6707E-5 |
| 17.300 | -0.099909 | -0.099955 | -9.1798 | 0.10002 | -4.5738E-5 |
| 17.400 | -0.098551 | -0.098532 | -6.6302 | 0.10073 | 1.9293E-5 |
| 17.500 | -0.095215 | -0.095125 | -4.1774 | 0.10244 | 9.0027E-5 |
| 17.600 | -0.089917 | -0.089769 | -1.8907 | 0.10512 | 1.4835E-4 |
| 17.700 | -0.082676 | -0.082516 | 0.19234 | 0.10874 | 1.5932E-4 |
| 17.800 | -0.073555 | -0.073440 | 2.0628 | 0.11328 | 1.1453E-4 |
| 17.900 | -0.062663 | -0.062631 | 3.7327 | 0.11868 | 3.1579E-5 |
| 18.000 | -0.050113 | -0.050197 | 5.2264 | 0.12490 | -8.4266E-5 |
| 18.100 | -0.036071 | -0.036263 | 6.5720 | 0.13187 | -1.9190E-4 |
| 18.200 | -0.020725 | -0.020967 | 7.7940 | 0.13952 | -2.4172E-4 |
| 18.300 | -0.0042541 | -0.0044617 | 8.9098 | 0.14777 | -2.0765E-4 |
| 18.400 | 0.013178 | 0.013087 | 9.9285 | 0.15654 | -9.1016E-5 |
| 18.500 | 0.031426 | 0.031504 | 10.853 | 0.16575 | 7.7440E-5 |
| 18.600 | 0.050362 | 0.050605 | 11.682 | 0.17530 | 2.4277E-4 |
| 18.700 | 0.069857 | 0.070200 | 12.415 | 0.18510 | 3.4286E-4 |
| 18.800 | 0.089760 | 0.090093 | 13.054 | 0.19505 | 3.3271E-4 |
| 18.900 | 0.10988 | 0.11008 | 13.607 | 0.20504 | 2.0363E-4 |
| 19.000 | 0.12999 | 0.12998 | 14.083 | 0.21499 | -1.0490E-5 |
| 19.100 | 0.14981 | 0.14957 | 14.493 | 0.22478 | -2.4063E-4 |
| 19.200 | 0.16907 | 0.16866 | 14.850 | 0.23433 | -4.0532E-4 |
| 19.300 | 0.18751 | 0.18707 | 15.160 | 0.24354 | -4.4125E-4 |
| 19.400 | 0.20494 | 0.20461 | 15.427 | 0.25231 | -3.2556E-4 |
| 19.500 | 0.22120 | 0.22111 | 15.648 | 0.26055 | -9.0753E-5 |
| 19.600 | 0.23621 | 0.23639 | 15.816 | 0.26820 | 1.8529E-4 |
| 19.700 | 0.24990 | 0.25031 | 15.924 | 0.27516 | 4.1052E-4 |
| 19.800 | 0.26223 | 0.26273 | 15.965 | 0.28137 | 5.0278E-4 |
| 19.900 | 0.27311 | 0.27353 | 15.933 | 0.28676 | 4.1996E-4 |
| 20.000 | 0.28240 | 0.28259 | 15.829 | 0.29129 | 1.8823E-4 |

* 1. Plot Groups
     1. 2D Plot Group 1



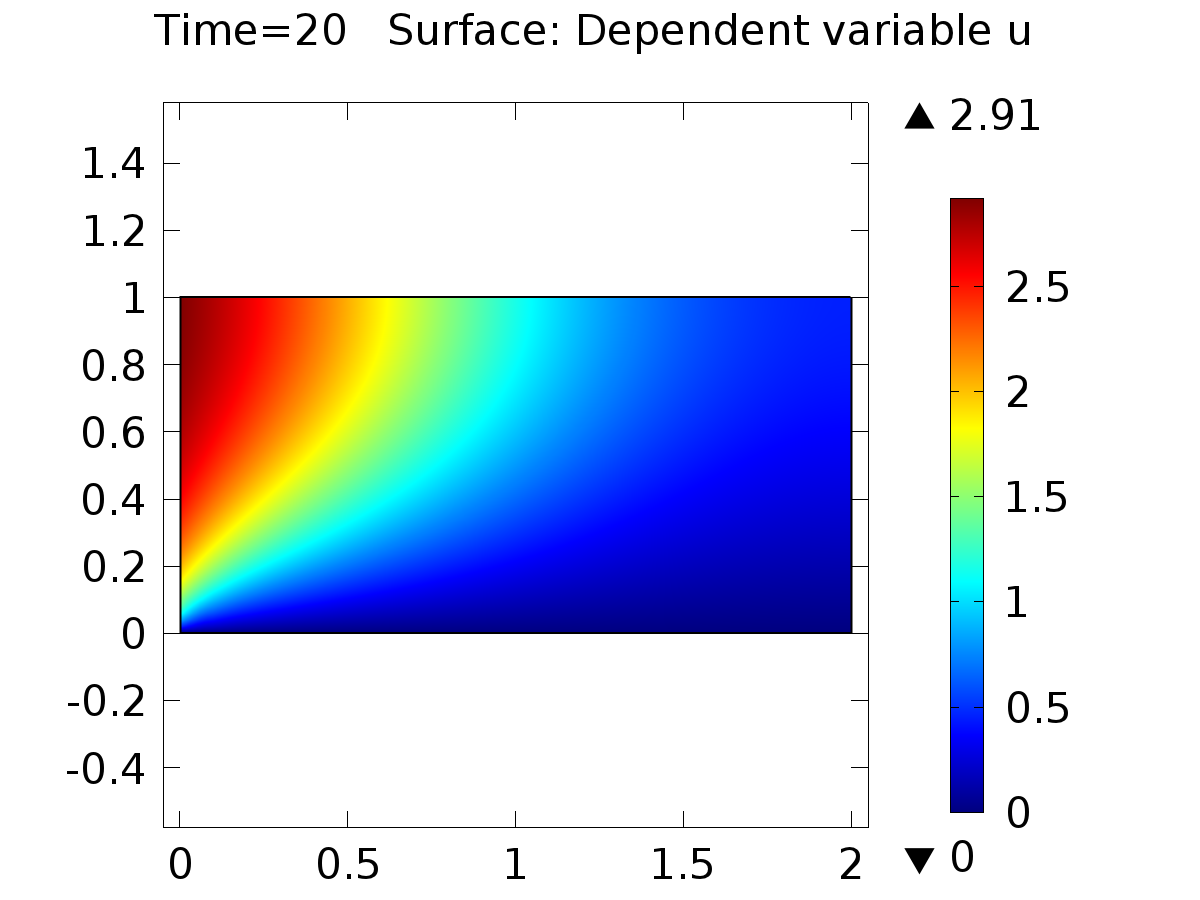
Surface: Dependent variable Xv

* + 1. 2D Plot Group 2



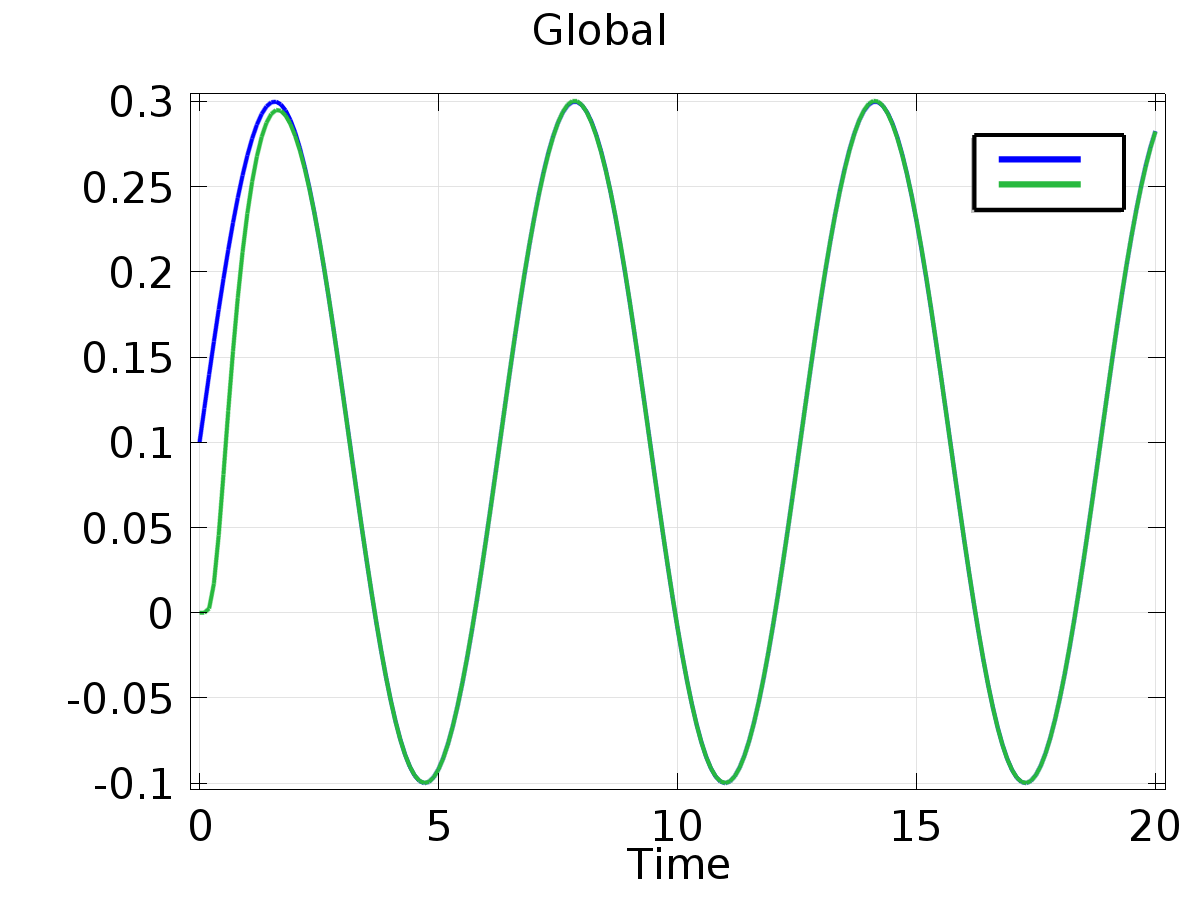
Surface: Dependent variable au4

* + 1. 2D Plot Group 3



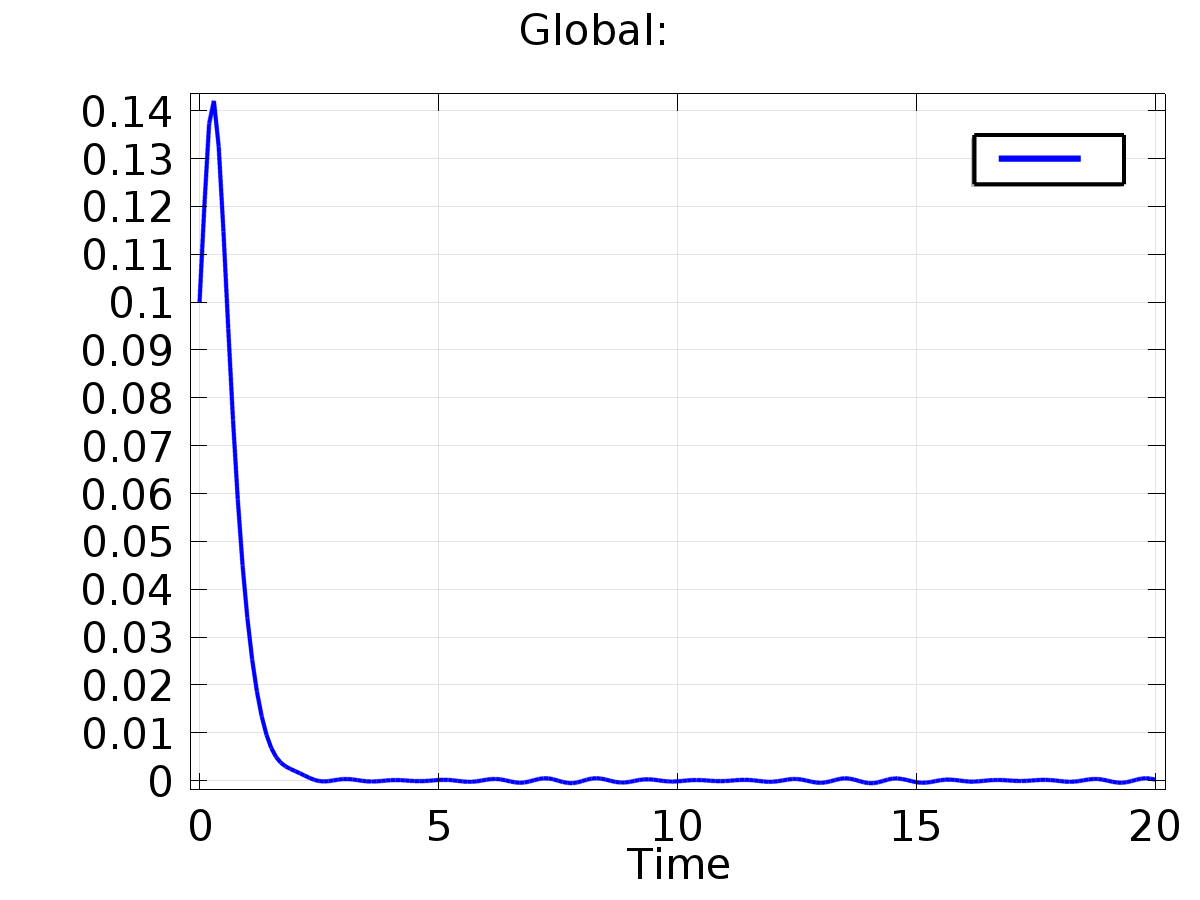
Time=20 Surface: Dependent variable u

* + 1. 1D Plot Group 4



Global

* + 1. 1D Plot Group 5



Global: