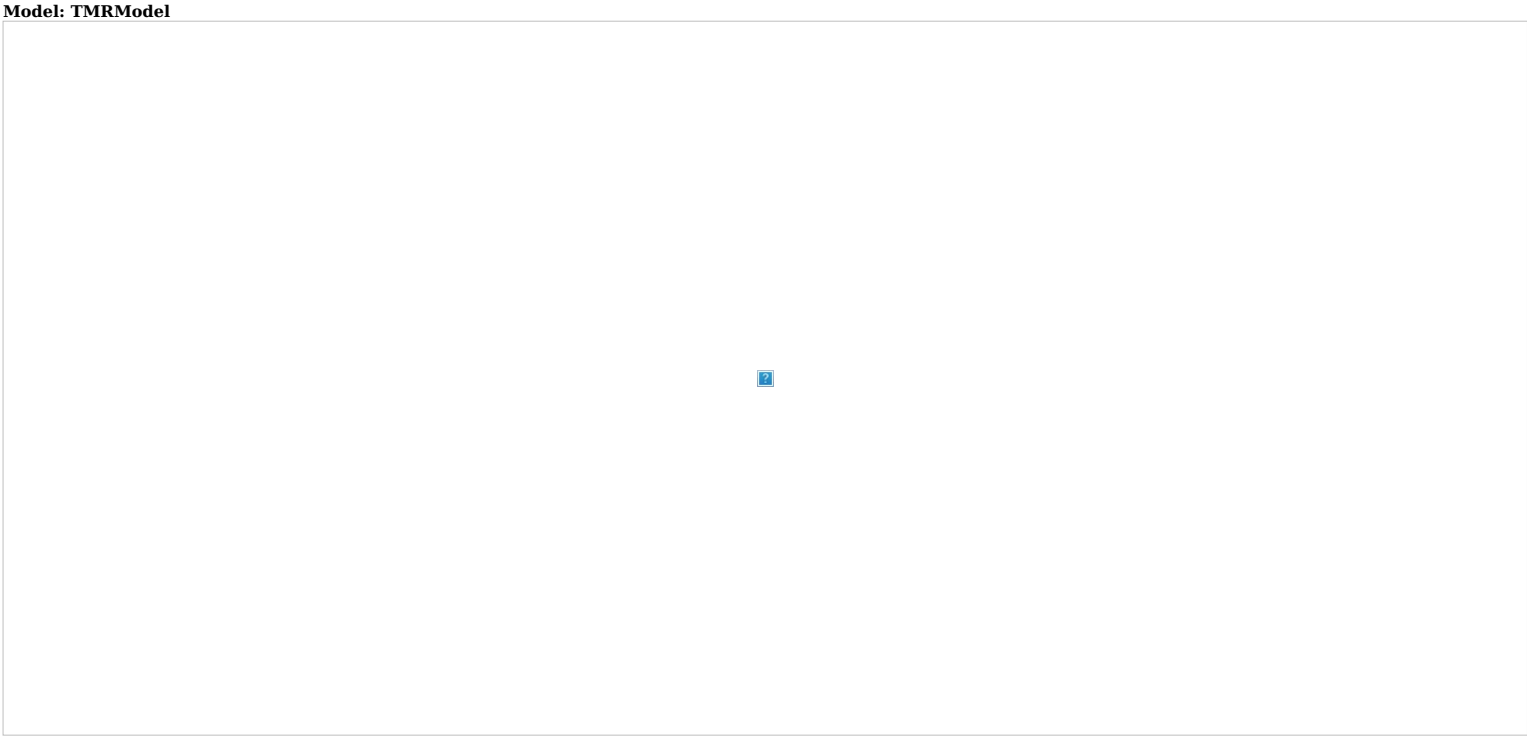
**Model: TMRModel**



**Place Attributes**:

| Place Names | Initial Markings |
|---|---|
| BadMajority | 0 |
| Channel1 | 1 |
| Channel1Failed | 0 |
| Channel2 | 1 |
| Channel2Failed | 0 |
| Channel3 | 1 |
| Channel3Failed | 0 |
| ErraticChannels | 0 |
| NoBadMajority | 0 |
| SafeState | 0 |
| SilentChannels | 0 |
| UnsafeState | 0 |
| Voters | 2 |

| Timed Activity: | CCF |
|---|---|
| Distribution Parameters | **Rate**<br>`r_ccf` |
| Activation Predicate | (none) |
| Reactivation Predicate | (none) |
| Case Distributions | **case 1**<br>`p_ccf2of3`<br>**case 2**<br>`p_ccf2of3`<br>**case 3**<br>`p_ccf2of3`<br>**case 4**<br>`1-3*p_ccf2of3` |

| Timed Activity: | Channel1Failure |
|---|---|
| Distribution Parameters | **Rate**<br>`fr_asilB` |
| Activation Predicate | (none) |
| Reactivation Predicate | (none) |

| Timed Activity: | Channel2Failure |
|---|---|
| Distribution Parameters | **Rate**<br>`fr_asilB` |
| Activation Predicate | (none) |
| Reactivation Predicate | (none) |

| Timed Activity: | Channel3Failure |
|---|---|
| Distribution Parameters | **Rate**<br>`fr_asilB` |
| Activation Predicate | (none) |
| Reactivation Predicate | (none) |

| Timed Activity: | VotersFailure |
|---|---|
| Distribution Parameters | **Rate**<br>`fr_asilD * Voters->Mark()` |
| Activation Predicate | (none) |
| Reactivation Predicate | (none) |

| Instantaneous Activity: | Channel1FailureType |
|---|---|
| Case Distributions | **case 1**<br>`p_channelsilent`<br>**case 2**<br>`1-p_channelsilent` |

| Instantaneous Activity: | Channel2FailureType |
|---|---|
| Case Distributions | **case 1**<br>p_channelsilent<br>**case 2**<br>1-p_channelsilent |

| Instantaneous Activity: | Channel3FailureType |
|---|---|
| Case Distributions | **case 1**<br>p_channelsilent<br>**case 2**<br>1-p_channelsilent |

| Instantaneous Activity: | ErraticsOutput |
|---|---|
| Case Distributions | **case 1**<br>p_badmajority<br>**case 2**<br>1-p_badmajority |

| Instantaneous Activity: | prebufferedMRM |
|---|---|
| Case Distributions | **case 1**<br>1-p_MRM<br>**case 2**<br>p_MRM |

| Instantaneous Activities Without Cases: |
|---|
| CatastrophicFailure |

| Input Gate: | Check2of3Erratics |
|---|---|
| Predicate | ErraticChannels->Mark()>=2 |
| Function | ErraticChannels->Mark()=0; |

| Input Gate: | CheckCatastrophicFailure |
|---|---|
| Predicate | SafeState->Mark()+UnsafeState->Mark()==0 &&<br>(BadMajority->Mark()==1 ||<br>(SilentChannels->Mark()==2 && ErraticChannels->Mark()==1)) |
| Function | ; |

| Input Gate: | CheckNonCatastrophicFailure |
|---|---|
| Predicate | SafeState->Mark()+UnsafeState->Mark()==0 &&<br>(SilentChannels->Mark()==3 ||<br>Voters->Mark()==0 ||<br>NoBadMajority->Mark()==1 ||<br>(SilentChannels->Mark()==1 && ErraticChannels->Mark()==1)) |
| Function | ; |

| Output Gate: | CCFChannels12 |
|---|---|
| Function | if (Channel1->Mark()+Channel2->Mark()==2)<br>{<br>Channel1->Mark()=0;<br>Channel2->Mark()=0;<br>Channel1Failed->Mark()=1;<br>Channel2Failed->Mark()=1;<br>} |

| Output Gate: | CCFChannels123 |
|---|---|
| Function | if (Channel1->Mark()+Channel2->Mark()+Channel3->Mark()==3)<br>{<br>Channel1->Mark()=0;<br>Channel2->Mark()=0;<br>Channel3->Mark()=0;<br>Channel1Failed->Mark()=1;<br>Channel2Failed->Mark()=1;<br>Channel3Failed->Mark()=1;<br>} |

| Output Gate: | CCFChannels13 |
|---|---|
| Function | if (Channel1->Mark()+Channel3->Mark()==2)<br>{<br>Channel1->Mark()=0;<br>Channel3->Mark()=0;<br>Channel1Failed->Mark()=1;<br>Channel3Failed->Mark()=1;<br>} |

| Output Gate: | CCFChannels23 |
|---|---|
| Function | if (Channel3->Mark()+Channel2->Mark()==2)<br>{<br>Channel3->Mark()=0;<br>Channel2->Mark()=0;<br>Channel3Failed->Mark()=1;<br>Channel2Failed->Mark()=1;<br>} |

**Range Study Variable Assignments for Study *TMRParameter* in Project *TMR* :**

| Variable | Type | Range Type | Range | Increment | Increment Type | Function | n |
|---|---|---|---|---|---|---|---|
| fr_asilB | double | Fixed | 1.0E-7 | - | - | - | - |
| fr_asilD | double | Fixed | 1.0E-8 | - | - | - | - |
| p_MRM | double | Fixed | 0.99 | - | - | - | - |
| p_badmajority | double | Fixed | 0.01 | - | - | - | - |
| p_ccf2of3 | double | Fixed | 0.3 | - | - | - | - |
| p_channelsilent | double | Fixed | 0.5 | - | - | - | - |
| r_ccf | double | Manual | [1.0E-8, 5.0E-9, 1.0E-9] | - | - | - | - |

| Performance Variable Model: TMRReward | | |
|---|---|---|
| Top Level Model Information | Child Model Name | TMRModel |
| | Model Type | SAN Model |

| Performance Variable : p_safestate | |
|---|---|
| Affecting Models | TMRModel |
| Impulse Functions | |
| Reward Function | *(Reward is over all Available Models)*<br>if (TMRModel->SafeState->Mark()==1) return 1; |

| | | | |
|---|---|---|---|
| Simulator Statistics | Type | Instant of Time | |
| | Options | Estimate Mean | |
| | | Include Lower Bound on Interval Estimate | |
| | | Include Upper Bound on Interval Estimate | |
| | | Estimate out of Range Probabilities | |
| | | Confidence Level is Relative | |
| | Parameters | Start Time | 1000.0,1500.0,2000.0,2500.0,3000.0,3500.0,4000.0,4500.0,5000.0,5500.0,6000.0,6500.0,7000.0,7500.0,8000.0, |
| | Confidence | Confidence Level | 0.95 |
| | | Confidence Interval | 0.1 |

| **Performance Variable : p_unsafestate** | | | |
|---|---|---|---|
| Affecting Models | TMRModel | | |
| Impulse Functions | | | |
| Reward Function | *(Reward is over all Available Models)*<br>`if (TMRModel->UnsafeState->Mark()==1) return 1;` | | |
| Simulator Statistics | Type | Instant of Time | |
| | Options | Estimate Mean | |
| | | Include Lower Bound on Interval Estimate | |
| | | Include Upper Bound on Interval Estimate | |
| | | Estimate out of Range Probabilities | |
| | | Confidence Level is Relative | |
| | Parameters | Start Time | 1000.0,1500.0,2000.0,2500.0,3000.0,3500.0,4000.0,4500.0,5000.0,5500.0,6000.0,6500.0,7000.0,7500.0,8000.0, |
| | Confidence | Confidence Level | 0.95 |
| | | Confidence Interval | 0.1 |