A

Document Type Definition

A.1 DTD pour MLMC (Meta Language for Model Coupling)

```
<!DOCTYPE MODEL [

<!ELEMENT MODEL (DESCRIPTION, TIME?, SPACE?, INIT?, IN?, OUT?, STATE?,
                        (SUBMODELS+, CONNECTIONS+)?)>

<!ELEMENT DESCRIPTION (#PCDATA)>

<!ELEMENT TIME (TIME_SPANS?, ORDER*, TIME_BASE*)>

<!ELEMENT TIME_SPANS (TIME_SPAN+)>

<!ELEMENT TIME_SPAN EMPTY>

<!ELEMENT ORDER (RELATION+)>

<!ELEMENT RELATION EMPTY>

<!ELEMENT TIME_BASE EMPTY>

<!ELEMENT SPACE (PLACES?, NEIGHBOURHOOD*, REFERENTIAL*, DISTANCE*)>

<!ELEMENT PLACES (PLACE+)>

<!ELEMENT PLACE EMPTY>

<!ELEMENT NEIGHBOURHOOD (NEIGHBOUR)>

<!ELEMENT NEIGHBOUR (#PCDATA)>

<!ELEMENT REFERENTIAL (AXIS+)>

<!ELEMENT AXIS EMPTY>

<!ELEMENT DISTANCE EMPTY>
```

```
35
    <!ELEMENT INIT (PORT+)>

    <!ELEMENT STATE (PORT+)>

40  <!ELEMENT IN (PORT+)>

    <!ELEMENT OUT (PORT+)>

    <!ELEMENT PORT (DATA+)>
45
    <!ELEMENT DATA (TYPE?, UNIT?, TIME_REF?, SPACE_REF?, METADATA?,
                                                  CONTENT?, AGREGATE?)>
    <!ELEMENT UNIT EMPTY>

50  <!ELEMENT TIME_REF EMPTY>

    <!ELEMENT SPACE_REF EMPTY>

    <!ELEMENT METADATA EMPTY>
55
    <!ELEMENT TYPE EMPTY>

    <!ELEMENT CONTENT (#PCDATA)>

60  <!ELEMENT AGREGATE (DATA+)>

    <!ELEMENT SUBMODELS (LI+)>

    <!ELEMENT LI EMPTY>
65
    <!ELEMENT CONNECTIONS (PORT_REF+, CONNECTION+)>

    <!ELEMENT PORT_REF EMPTY>

70  <!ELEMENT CONNECTION EMPTY>

    <!ATTLIST MODEL         name CDATA #REQUIRED
                            type (atomic | coupled) #REQUIRED
                            autonomous (yes | no) #REQUIRED
75                          xmlns:xlink CDATA
                                  #FIXED 'http://www.w3.org/1999/xlink'>

    <!ATTLIST TIME          type (set | ordinal | cardinal) #REQUIRED>

80  <!ATTLIST TIME_SPAN     name  CDATA #REQUIRED
                            begin CDATA #IMPLIED
                            end   CDATA #IMPLIED>

    <!ATTLIST RELATION      sequence CDATA #REQUIRED>
85
    <!ATTLIST TIME_BASE     type (discrete | continuous) #REQUIRED
                            unit  CDATA #REQUIRED
                            begin CDATA #REQUIRED
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                          end   CDATA #REQUIRED
                          step  CDATA #IMPLIED>

    <!ATTLIST SPACE       name CDATA #REQUIRED
                          type (topological | metric | set) #REQUIRED>

    <!ATTLIST PLACE       name  CDATA #REQUIRED
                          begin CDATA #IMPLIED
                          end   CDATA #IMPLIED>

    <!ATTLIST NEIGHBOUR   link CDATA #IMPLIED
                          type (von_neumman | moore | none) #IMPLIED>

    <!ATTLIST REFERENTIAL type (discrete | continuous) #REQUIRED
                          dimension CDATA #REQUIRED>

    <!ATTLIST AXIS        id   CDATA #REQUIRED
                          min  CDATA #REQUIRED
                          max  CDATA #REQUIRED
                          step CDATA #IMPLIED>

    <!ATTLIST DISTANCE    type CDATA #REQUIRED>


    <!ATTLIST DATA        name CDATA #REQUIRED
                          xlink:type (extended) #FIXED 'extended'>

    <!ATTLIST TYPE        class CDATA #REQUIRED>

    <!ATTLIST UNIT        class CDATA #REQUIRED
                          power CDATA #REQUIRED>

    <!ATTLIST TIME_REF    xlink:type (locator) #FIXED 'locator'
                          xlink:href CDATA #REQUIRED>

    <!ATTLIST SPACE_REF   xlink:type (locator) #FIXED 'locator'
                          xlink:href CDATA #REQUIRED>

    <!ATTLIST METADATA    xlink:type (locator) #FIXED 'locator'
                          xlink:href CDATA #REQUIRED>

    <!ATTLIST CONTENT     dimension CDATA #REQUIRED
                          size CDATA #REQUIRED>

    <!ATTLIST PORT        name CDATA #REQUIRED>

    <!ATTLIST LI          xlink:type (simple) #FIXED 'simple'
                          xlink:href CDATA #REQUIRED>

    <!ATTLIST PORT_REF    xlink:type (locator) #FIXED 'locator'
                          xlink:label CDATA #REQUIRED
                          xlink:href CDATA #REQUIRED>

    <!ATTLIST CONNECTIONS xlink:type (extended) #FIXED 'extended'>
```

```
<!ATTLIST CONNECTION    type (EIC | IOC | IC) #REQUIRED
                        xlink:type (arc) #FIXED 'arc'
                        xlink:from CDATA #REQUIRED
                        xlink:to CDATA #REQUIRED>      ]>
```

A.2 DTD pour MLVE (Meta Language for Virtual Experiments)

```
<!DOCTYPE EXPERIMENT [

<!ELEMENT EXPERIMENT (NOTES, MODEL+)>

<!ELEMENT NOTES (#PCDATA)>

<!ELEMENT MODEL (DESCRIPTION, EXECUTABLE, OUTPUT_STREAM, EXECUTION,
                 EXPERIMENTAL_CONDITIONS, MEASURES)>

<!ELEMENT DESCRIPTION EMPTY>

<!ELEMENT EXECUTABLE EMPTY>

<!ELEMENT OUTPUT_STREAM EMPTY>

<!ELEMENT EXECUTION (EXECUTION_NODE+)>

<!ELEMENT EXECUTION_NODE EMPTY>

<!ELEMENT EXPERIMENTAL_CONDITIONS (CONDITION+)>

<!ELEMENT CONDITION ((SET | INTERVAL)?, CONSTRAINST?, RANDOM?)>

<!ELEMENT INTERVAL EMPTY>

<!ELEMENT SET (ITEM+)>

<!ELEMENT ITEM EMPTY>

<!ELEMENT RANDOM EMPTY>

<!ELEMENT CONSTRAINST (GREATER_THAN*, LOWER_THAN*, EQUAL_TO*,
                       GREATER_EQUAL_THAN*, LOWER_EQUAL_THAN*)>

<!ELEMENT GREATER_THAN (MULT | ADD | DIV | MINUS | EXP | SQRT |
                       LOG | SIN | COS)>

<!ELEMENT LOWER_THAN (MULT | ADD | DIV | MINUS | EXP | SQRT | LOG |
                       SIN | COS)>

<!ELEMENT EQUAL_TO (MULT | ADD | DIV | MINUS | EXP | SQRT | LOG |
                       SIN | COS)>
```

```
<!ELEMENT GREATER_EQUAL_THAN (MULT | ADD | DIV | MINUS | EXP | SQRT |
                        LOG | SIN | COS)>

<!ELEMENT LOWER_EQUAL_THAN (MULT | ADD | DIV | MINUS | EXP | SQRT |
                        LOG | SIN | COS)>

<!ELEMENT MULT (CONST*, VAR*)>

<!ELEMENT ADD (CONST*, VAR*)>

<!ELEMENT DIV (CONST*, VAR*)>

<!ELEMENT EXP (CONST*, VAR*)>

<!ELEMENT MINUS (CONST*, VAR*)>

<!ELEMENT SQRT (CONST*, VAR*)>

<!ELEMENT LOG (CONST*, VAR*)>

<!ELEMENT SIN (CONST*, VAR*)>

<!ELEMENT COS (CONST*, VAR*)>

<!ELEMENT CONST EMPTY>

<!ELEMENT VAR EMPTY>

<!ELEMENT MEASURES (MEASURE+)>

<!ELEMENT MEASURE EMPTY>

<!ATTLIST EXPERIMENT    name CDATA #REQUIRED
                        date CDATA #REQUIRED>

<!ATTLIST MODEL         xmlns:xlink CDATA #FIXED
                              'http://www.w3.org/1999/xlink'
                        xlink:type (extended) #FIXED 'extended'>

<!ATTLIST DESCRIPTION   xlink:type (locator) #FIXED 'locator'
                        xlink:href CDATA #REQUIRED>

<!ATTLIST EXECUTABLE    xlink:type (locator) #FIXED 'locator'
                        xlink:href CDATA #REQUIRED>

<!ATTLIST OUTPUT_STREAM xlink:type (locator) #FIXED 'locator'
                        xlink:href CDATA #REQUIRED>

<!ATTLIST EXECUTION     type (mono | distributed | parralel) #REQUIRED>

<!ATTLIST EXECUTION_NODE xlink:type (locator) #FIXED 'locator'
                         xlink:href CDATA #REQUIRED>

<!ATTLIST EXPERIMENTAL_CONDITIONS replicat CDATA #REQUIRED
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                                apply (sequential | cartesian) #REQUIRED>

<!ATTLIST CONDITION     xmlns:pathtoport CDATA #FIXED
                              'http://www.w3.org/1999/xlink'
                        pathtoport:type (simple) #FIXED 'simple'
                        pathtoport:href CDATA #REQUIRED>

<!ATTLIST INTERVAL      begin CDATA #REQUIRED
                        end CDATA #REQUIRED
                        step CDATA #IMPLIED>

<!ATTLIST RANDOM        function (uniform | normal | lognormal |
                        exponential | poisson | beta | gamma) #REQUIRED
                        average CDATA #IMPLIED
                        standard_deviation CDATA #IMPLIED
                        a CDATA #IMPLIED
                        b CDATA #IMPLIED>

<!ATTLIST ITEM          value CDATA #REQUIRED>

<!ATTLIST CONST         value CDATA #REQUIRED>

<!ATTLIST VAR           pathtoport:type (simple) #FIXED 'simple'
                        pathtoport:href CDATA #REQUIRED>

<!ATTLIST MEASURES      xmlns:pathtoport CDATA #FIXED
                                        'http://www.w3.org/1999/xlink'
                        pathtoport:type (extended) #FIXED 'extended'>

<!ATTLIST MEASURE       pathtoport:type (locator) #FIXED 'locator'
                        pathtoport:href CDATA #REQUIRED
                        frequence CDATA #IMPLIED
                        type (active | passive) #IMPLIED
                        apply CDATA #IMPLIED>
]>
```