
Subject: Re: TrainResistance definition in MathML

Posted by [Susanne Wunsch railML](#) on Thu, 29 Aug 2013 12:05:32 GMT

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Hello Thomas,

Thomas Albrecht <Thomas.K.Albrecht@tu-dresden.de> writes:

- > or 2)mathml.
- > ValueTable should be straightforward, but in practice, it seems that
- > rather formulas of the kind
- > $fW = A + C * (V + X)$ (A, C parameters, V speed of train, X wind speed)
- > or similar are given, which is probably better formulated using MathML.
- >
- > A) Has anyone worked with MathML?

No experiences from my side.

- > B) Should we use standard symbols and units in order to make it
- > understandable?

Of course! ;-)

I checked the current MathML standard (version 3.0) and tried to make a proposal for usage in the railML context.

MathML is now widely understood in different tools, but there seems to be great differences between the MathML versions and the degree of implementation completeness.

- * Apache OpenOffice4 displays the "Presentation-Mode" if it's separated into a file.
- * Firefox23 displays the "Presentation-Mode" if it's separated into a file without the "Content-Mode".
- * LibreOffice4.1 doesn't understand this MathML-version.

I would be interested in further reports about usability of the following MathML code: Mathematica?, MATLAB?, M\$ Office?, IE?, Chrome?, Opera? ...

Copy the following lines into a file. Maybe you should snip the MathML part out for testing in MathML-aware tools.

```
?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE math [
  <ENTITY middot      "&#x000B7;"> <!--MIDDLE DOT -->
  <ENTITY InvisibleTimes "&#x02062;" ><!--INVISIBLE TIMES -->
]>
<!-- First proposal for definition of formulas inside railML elements
```

Following references were used:

- * Mathematical Markup Language (MathML) Version 3.0, Chapter 5 Mixing Markup Languages for Mathematical Expressions,

W3C Recommendation 21 October 2010:

<http://www.w3.org/TR/MathML3/chapter5.html#mixing.parallel>

- * Units in MathML,

W3C Working Group Note 10 November 2003: <http://www.w3.org/TR/mathml-units/>

- * Definition identifier URNs in OGC namespace, Version 1.3, OGC document number 07-092r3

Open Geospatial Consortium Inc.: http://portal.opengeospatial.org/files/?artifact_id=30575

- * The Unified Code for Units of Measure (UCUM), XML releases of the formal part of the specification,

UCUM: <http://unitsofmeasure.org/ucum-essence.xml>

- * XML Entity Definitions for Characters, The expanded set of HTML and MathML entity definitions,

W3C Recommendation 01 April 2010: <http://www.w3.org/2003/entities/2007/htmlmathml-f.ent>

-->

```
<railml xmlns="http://www.railml.org/schemas/2013"
```

```
xmlns:dc="http://purl.org/dc/elements/1.1/"
```

```
xmlns:mml="http://www.w3.org/1998/Math/MathML">
```

```
<rollingstock id="r1">
```

```
<metadata>
```

```
<dc:title>railML rollingstock sample</dc:title>
```

```
<dc:description>Proposal for train resistance definition with a formula</dc:description>
```

```
<dc:creator>Susanne Wunsch</dc:creator>
```

```
</metadata>
```

```
<vehicles>
```

```
<vehicle id="v1"/>
```

```
<vehicle id="v2"/>
```

```
</vehicles>
```

```
<formations>
```

```
<formation id="f1">
```

```
<trainOrder>
```

```
<vehicleRef orderNumber="1" vehicleRef="v1"/>
```

```
<vehicleRef orderNumber="2" vehicleRef="v2" vehicleCount="9"/>
```

```
</trainOrder>
```

```
<trainResistance>
```

```
<mml:math>
```

```
<mml:semantics>
```

```
<!-- Content mathematical expression:  $17,456 \text{ N} + 5,677 \text{ Ns/m} \cdot v + 1,234 \text{ Ns}^2/\text{m}^2 \cdot$ 
```

```
 $v^2$  -->
```

```
<!-- TODO: Currently missing: definition of uom for variable 'v'-->
```

```
<mml:apply>
```

```
<mml:plus/>
```

```
<mml:apply>
```

```
<mml:times/>
```

```
<mml:cn type="constant">17,456</mml:cn>
```

```
<mml:csymbol definitionURL="urn:ogc:def:uom:UCUM::N">N</mml:csymbol>
```

```
</mml:apply>
```

```

<mml:apply>
  <mml:times/>
  <mml:cn href="">5,677</mml:cn>
  <mml:apply>
    <mml:times/>
    <mml:csymbol definitionURL="urn:ogc:def:uom:UCUM::N">N</mml:csymbol>
    <mml:apply>
      <mml:divide/>
      <mml:csymbol definitionURL="urn:ogc:def:uom:UCUM::s">s</mml:csymbol>
      <mml:csymbol definitionURL="urn:ogc:def:uom:UCUM::m">m</mml:csymbol>
    </mml:apply>
  </mml:apply>
  <mml:ci>v</mml:ci>
</mml:apply>
<mml:apply>
  <mml:times/>
  <mml:cn type="constant">1,234</mml:cn>
  <mml:apply>
    <mml:times/>
    <mml:csymbol definitionURL="urn:ogc:def:uom:UCUM::N">N</mml:csymbol>
    <mml:apply>
      <mml:power/>
      <mml:apply>
        <mml:divide/>
        <mml:csymbol definitionURL="urn:ogc:def:uom:UCUM::s">s</mml:csymbol>
        <mml:csymbol definitionURL="urn:ogc:def:uom:UCUM::m">m</mml:csymbol>
      </mml:apply>
      <mml:cn>2</mml:cn>
    </mml:apply>
  </mml:apply>
  <mml:apply>
    <mml:power/>
    <mml:ci>v</mml:ci>
    <mml:cn>2</mml:cn>
  </mml:apply>
</mml:apply>
<mml:annotation-xml style="MathML-Presentation">
  <!-- Presentation mathematical expression: 17,456 N + 5,677 Ns/m * v + 1,234
Ns^2/m^2 * v^2 -->
  <mml:mrow>
    <mml:mn>17,456</mml:mn>
    <mml:mo rspace='thickmathspace'>&InvisibleTimes;</mml:mo>
    <mml:mi mathvariant='normal' class='MathML-Unit'>N</mml:mi>
    <mml:mo>+</mml:mo>
  </mml:mrow>
  <mml:mn>5,677</mml:mn>
  <mml:mo rspace='thickmathspace'>&InvisibleTimes;</mml:mo>

```

```

<mml:mrow>
  <mml:mi mathvariant='normal' class='MathML-Unit'>N</mml:mi>
  <mml:mo>&middot;</mml:mo>
  <mml:mfrac>
    <mml:mi mathvariant='normal' class='MathML-Unit'>s</mml:mi>
    <mml:mi mathvariant='normal' class='MathML-Unit'>m</mml:mi>
  </mml:mfrac>
</mml:mrow>
<mml:mo>&InvisibleTimes;</mml:mo>
<mml:mi>v</mml:mi>
</mml:mrow>
<mml:mo>+</mml:mo>
<mml:mrow>
  <mml:mn>1,234</mml:mn>
  <mml:mo rspace='thickmathspace'>&InvisibleTimes;</mml:mo>
  <mml:mrow>
    <mml:mi mathvariant='normal' class='MathML-Unit'>N</mml:mi>
    <mml:mo>&middot;</mml:mo>
    <mml:mfrac>
      <mml:msup>
        <mml:mi mathvariant='normal' class='MathML-Unit'>s</mml:mi>
        <mml:mn>2</mml:mn>
      </mml:msup>
      <mml:msup>
        <mml:mi mathvariant='normal' class='MathML-Unit'>m</mml:mi>
        <mml:mn>2</mml:mn>
      </mml:msup>
    </mml:mfrac>
  </mml:mrow>
  <mml:mo>&InvisibleTimes;</mml:mo>
  <mml:msup>
    <mml:mi>v</mml:mi>
    <mml:mn>2</mml:mn>
  </mml:msup>
</mml:mrow>
</mml:mrow>
</mml:annotation-xml>
</mml:semantics>
</mml:math>
</trainResistance>
</formation>
</formations>
</rollingstock>
</railml>

```

Kind regards...
 Susanne

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Susanne Wunsch
Schema Coordinator: railML.common
