Workshop: Advanced JSXGraph II

2. International JSXGraph Conference

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Contents

Arrow heads

- We have a (new) arrow head construction tool based on the JSXGraph implementation of META-POST splines.
- http://jsxgraph.uni-bayreuth.de/~alfred/jsxdev/mp_arrowheads.html
- Output is a Bezier curve

More new features from 1.2.0 to 1.3.2

Angles: adaptive radius

- https://jsfiddle.net/6z5L8ocf/
- Attribute `radius`: new default `'auto'`

```
var pol = board.create('polygon', [[-3,-3], [3,-3], [1,4]], {
        fillColor: 'yellow',
        vertices: {
            color: 'blue',
        }
});
var alpha = board.create('angle', [
  pol.vertices[1], pol.vertices[0], pol.vertices[2]
]);
```

Fixed angles with `setAngle()`

- Does not fix any point anymore
- https://jsfiddle.net/5pemsqLz/

```
var p1, p2, p3, c, a, s;

p1 = board.create('point',[0,0]);
p2 = board.create('point',[5,0]);
p3 = board.create('point',[0,5]);

c1 = board.create('circle',[p1, p2]);

a = board.create('angle',[p2, p1, p3], {radius:3});

a.setAngle(function() {
    return Math.PI / 3;
});
board.update();
```

KaTeX support

- JSXGraph already supports MathJax (v2 and v3).
- Meanwhile, KaTeX is supported, too.
- Not documented in API, yet
- See https://jsfiddle.net/70tvfs1g/1/

```
<link rel="stylesheet" href="https://cdn.jsdelivr.net/npm/katex.css/dist/katex.min.
    css">
<script src="https://cdn.jsdelivr.net/npm/katex/dist/katex.min.js"></script>
```

```
JXG.Options.text.useKatex = true;

const board = JXG.JSXGraph.initBoard('jxgbox', {
    boundingbox: [-2, 5, 8, -5], axis:true
});
var a = board.create('slider',[[-0.7,1.5],[5,1.5],[0,0.5,1]], {
    suffixlabel:'t_1=',
    unitLabel: ' \\text{ ms}',
    snapWidth:0.01});

func = board.create('functiongraph',[function(x){return (a.Value()*x*x)}], {
    strokeColor: "red"});
text1 = board.create('text', [5, 1, function(){
            return 'a(t)= { 1 \\over ' + a.Value().toFixed(3) + '}';
        }], {fontSize: 15, fixed:true, strokeColor:'red', anchorY: 'top'});
```

New math functions

- `erf`, `erfc`, `erfi`, `ndtr`, `ndtri`, `acosh`, `asinh` available in `JXG.Math`,
- see http://jsxgraph.org/docs/symbols/JXG.Math.html
- Boolean operators available as functions: `lt`, `gt`, `leq`, `geq`, `eq`, `neq`, `not`, `and`, `or`, `xor`. These are useful if an LMS filter throws out `<`, `>`, `&`.

```
  if (JXG.Math.lt(x, y)) {}
```

JessieCode tags support attribute `src`

- Load JessieCode program from file

```
<script type="text/jessiecode" src="testsrc.jc" axis="true">

for (i = 0; i < 10; i = i + 1) {
    point(map (x) -> 10 * random()- 5, map (x) -> 10 * random()- 5) <<color: 'blue
        ', withLabel: false >>;
}
```

```
</script>
```

Upcoming JSXGraph features

Lagrange polynomial

- Get function term with `JXG.Math.Numerics.lagrangePolynomialString()`

```
var points = [];
points[0] = board.create('point', [-2,4], {size:4});
points[1] = board.create('point', [0, 0], {size:4});
points[2] = board.create('point', [2, 4], {size:4});

var f = JXG.Math.Numerics.lagrangePolynomial(points);
var graph = board.create('functiongraph', [f,-10, 10], {strokeWidth:3});

var f_txt = JXG.Math.Numerics.lagrangePolynomialString(points, 2, 't', ' * ');
var txt = board.create('text', [-3, -4, () => 'f(t) = ' + f_txt()], {fontSize: 16})
    ;
```

New JSXGraph element `foreignobject`

Why?

- JSXGraph elements are positioned in 20 layers above each others.
- JSXGraph element `text`:
  - Using `display:'html'` allows to add *arbitrary* HTML code in a div element **above** the construction
  - Using `display:'internal'` allows to insert *simple* text (without HTML) in an *arbitrary* layer. (Using the SVG element `text`)
- SVG element `foreignObject` allows to add *arbitrary* HTML code in an *arbitrary* layer.
- In the next version there will be the new JSXGraph element `foreignobject`.

Examples

- Add HTML div element in a `foreignobject`:

```
var p1 = board.create('point', [-2, 3], {name: 'layer 7', size: 10, layer: 7, label
    : {fontSize: 16}});
var p2 = board.create('point', [2, 3],  {name: 'layer 9', size: 10, color: 'blue',
    layer: 9, label: {fontSize: 16}});
```

```
var fo = board.create('foreignobject', [
    '<div class="block">A string in a div in layer 8</div>',
    [-2, -4], [6, 3]], {layer: 8} );
```

- Add video in a `foreignobject`:

```
var fo = board.create('foreignobject', [
    '<video width:"100%" height="100%" src="https://eucbeniki.sio.si/vega2/278/
        Video_metanje_oge_.mp4" type="html5video" controls>',
    [-6, -3], [12, 8]],
    {layer: 0, fixed: true}
 );
```

- Embed another JSXGraph construction in an iframe:

```
var fo = board.create('foreignobject', [
    '<iframe width="99%", height="99%" src="../polygon_skm.html"></iframe>',
    [-7, 1], [6, 6]],
    {layer: 2, fixed: true}
 );
```

JSXGraph ecosystem

Upcoming: H5P content type

- github project: https://github.com/jsxgraph/H5P.JSXGraph
- help with translation: https://translate-h5p.tk/
- status: submitted to H5P.ORG

A new place to share constructions

- https://jsxgraph.org/share
- https://youtu.be/_Fc5Smt4H4U
- Will be available $\approx$ January 2022