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1  <!--
2  *****
3  * @file      : Orientation.html
4  * @author    : Kyunghwan Yoo
5  * @version   : V1.0
6  * @date      : 2015/10/12
7  * @brief     : Orientation
8  *****
9  * @attention : Html, Java7u17, JavaScript, Mathematics, Live3D
10 *****
11 -->
12 <body oncontextmenu='return false' ondragstart='return
false'><STYLE>DIV{width:100%;height:100%;}input{width:50;}</STYLE><TABLE width=100%
height=100% cellSpacing=0 cellPadding=0><TR><TD vAlign=center align=middle><DIV id=P
name=P style='height:100%'></DIV></TD></TR></TABLE><SCRIPT language=JavaScript>
13 var IV="", DV="", IP="";
14 var rl=36,R=500;
15
16 DV+="RAD2DEG -> 180/Pi, DEG2RAD -> Pi/180,";
17 DV+="XEx -> 50, XEy -> 0, XEz -> 0, YEx -> 0, YEy -> 50, YEz -> 0, ZEx -> 0, ZEY ->
0, ZEz -> 50,";
18 DV+="dd->30,";
19 var Sw=850, Sh=425;
20 IP+="RGBColor[.0,.0,.0],Line[{{-"+Sw+", "+Sh+",0},{ "+Sw+", "+Sh+",0},{ "+Sw+", -"+Sh+",0},{ -"+
Sw+", -"+Sh+",0},{ -"+Sw+", "+Sh+",0}}],";
21
22 var P0y = 350, P1y = 190, P2y = -30, P3y = -250;
23 IP+="Text[\"Z→Y→X Local_Axis\",{300,\"+P0y\"+10,0}],";
24 IP+="Text[\"X→Y→Z Global_Axis\",{300,\"+P0y\"-10,0}],";
25
26 IV+="P1x->-500,P1y-> "+P1y+", ";
27 IP+="Point[{P1x,P1y,0}],Text[\"RM,Q -> EV,VA,VB\",{P1x-100,P1y,0},{1,0}],";
28 IV+="P2x->-500,P2y-> "+P2y+", ";
29 IP+="Point[{P2x,P2y,0}],Text[\"EV,VA,AB\",{P2x-100,P2y,0},{1,0}],";
30 IV+="P3x->-500,P3y-> "+P3y+", ";
31 IP+="Point[{P3x,P3y,0}],Text[\"AB\",{P3x-100,P3y,0},{1,0}],";
32
33 IV+="CAB->"+P2y+", ";
34 DV+="CAB->If[CAB>"+(P2y+P3y)/2+", "+P2y+", "+P3y+"],";
35 IP+="Line[{{-260,\"+P2y\",0},{-260,\"+P3y\",0}},Point[{-260,CAB,0}],";
36
37 //////////// Calcate V
38 ctrlRPY("EV",-120,45,-20); vCtrlRPY("EV",P0y);
39 cRPY2RM("EV","erEV");
40 cRM2AA("erEV","raEV");
41 cRM2Q("erEV","rqEV");
42 cAA2Q("raEV","aqEV");
43
44 //////////// Calcate A
45 ctrlRPY("VA",0,0,0); vCtrlRPY("VA",P1y);
46 cRPY2RM("VA","erVA"); vRotationMatrix("erVA","RPY2RM",350,P1y);
47 cRM2RPY("erVA","reVA"); vRPY("reVA","RM2RPY",250,P1y-100);
48 cRM2AA("erVA","raVA"); vAxisAngle("raVA","RM2AA",350,P1y-100);
49 cRM2Q("erVA","rqVA"); vQuaternion("rqVA","RM2Q",500,P1y);
50 cAA2Q("raVA","aqVA"); vQuaternion("aqVA","AA2Q",500,P1y-100);
51 cQ2RM("aqVA","q2rVA"); vRotationMatrix("q2rVA","Q2RM",650,P1y);
52 cAA2RM("raVA","arVA"); vRotationMatrix("arVA","AA2RM",650,P1y-100);
53 cQ2RPY("aqVA","qeVA"); vRPY("qeVA","Q2RPY",750,P1y);
54
55 //////////// Calcate B
56 ctrlRPY2("VB","CAB<"+(P2y+P3y)/2,"reVAB",0,0,0); vCtrlRPY("VB",P2y);
57 cRPY2RM("VB","erVB"); vRotationMatrix("erVB","RPY2RM",350,P2y);
58 cRM2RPY("erVB","reVB"); vRPY("reVB","RM2RPY",250,P2y-100);
59 cRM2AA("erVB","raVB"); vAxisAngle("raVB","RM2AA",350,P2y-100);
60 cRM2Q("erVB","rqVB"); vQuaternion("rqVB","RM2Q",500,P2y);
61 cAA2Q("raVB","aqVB"); vQuaternion("aqVB","AA2Q",500,P2y-100);
62 cQ2RM("aqVB","q2rVB"); vRotationMatrix("q2rVB","Q2RM",650,P2y);
63 cAA2RM("raVB","arVB"); vRotationMatrix("arVB","AA2RM",650,P2y-100);
64 cQ2RPY("aqVB","qeVB"); vRPY("qeVB","Q2RPY",750,P2y);
65
66 //////////// Calcate AB
67 ctrlRPY2("AB","CAB>"+(P2y+P3y)/2,"reAVB",0,0,0); vCtrlRPY("AB",P3y);
68 cRPY2RM("AB","erAB"); vRotationMatrix("erAB","RPY2RM",350,P3y);
69 cRM2RPY("erAB","reAB"); vRPY("reAB","RM2RPY",250,P3y-100);
70 cRM2AA("erAB","raAB"); vAxisAngle("raAB","RM2AA",350,P3y-100);
71 cRM2Q("erAB","rqAB"); vQuaternion("rqAB","RM2Q",500,P3y);

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72 cAA2Q("raAB","aqAB");          vQuaternion("aqAB","AA2Q",500,P3y-100);
73 cQ2RM("aqAB","q2rAB");          vRotationMatrix("q2rAB","Q2RM",650,P3y);
74 cAA2RM("raAB","arAB");          vRotationMatrix("arAB","AA2RM",650,P3y-100);
75 cQ2RPY("aqAB","qeAB");          vRPY("qeAB","Q2RPY",750,P3y);
76
77 ////////////////////////////////////////////////// Axis EV
78 cRM2XYZ("erEV","rxEV");          mXYZ("rxEV",0.00005,0.8,0,2,"P1x","P1y");
79 cQ2XYZ("aqEV","qxEV");          mXYZ("qxEV",0.00005,0.8,0,2,"P2x","P2y");
80                                     mXYZ("E",0.00003,0.7,0,2,"P3x","P3y");
81 cRM2RPY("erEV","reEV");          vRPY("reEV","EV",-650,P0y);
82
83 ////////////////////////////////////////////////// Axis EA
84 cRM_Dot("erEV","erVA","erEA");
85 cRM2RPY("erEA","reEA");          vRPY("reEA","EA",-500,P0y);
86 cRM2XYZ("erEA","rxEA");          mXYZ("rxEA",0.005,1.0,0.1,1,"P1x","P1y");
87
88 cQ_Product("aqEV","aqVA","aqEA");
89 cQ2XYZ("aqEA","qxEA");          mXYZ("qxEA",0.005,1.0,0.1,1,"P2x","P2y");
90 cQ_Product("rqEV","rqVA","rqEA");
91 cQ2XYZ("rqEA","rqxEA");          mXYZ("rqxEA",0.002,1.0,0.1,1.2,"P2x","P2y");
92
93 ////////////////////////////////////////////////// Axis EB
94 cRM_Dot("erEV","erVB","erEB");
95 cRM2RPY("erEB","reEB");          vRPY("reEB","EB",-350,P0y);
96 cRM2XYZ("erEB","rxEB");          mXYZ("rxEB",0.003,1.0,0.4,1.2,"P1x","P1y");
97
98 cQ_Product("aqEV","aqVB","aqEB");
99 cQ2XYZ("aqEB","qxEB");          mXYZ("qxEB",0.003,1.0,0.4,1.2,"P2x","P2y");
100
101 ////////////////////////////////////////////////// Axis AB
102 cRM_Dot("erEA","erAB","erEAB");
103 cRM2XYZ("erEAB","rxEAB");          mXYZ("rxEAB",0.003,1.0,0.4,1.2,"P1x","P1y");
104
105 ////////////////////////////////////////////////// Inverse
106 // VAxAB>>VB
107 cRM_Dot("erVA","erAB","erVAB");
108 cRM2RPY2("erVAB","reVAB");          vRPY("reVAB","VAR.ABR>>VBR",-300,P2y);
109 cRM_Dot("erEV","erVAB","erEVAB");
110 cRM2XYZ("erEVAB","rxEVAB");          mXYZ("rxEVAB",0.008,1.0,0.4,0.3,"P1x","P1y");
111
112 cQ_Product("aqEA","aqAB","aqVAB");
113 cQ2XYZ("aqVAB","qxVAB");          mXYZ("qxVAB",0.008,1.0,0.4,0.3,"P2x","P2y");
114 cQ_Product("rqEA","rqAB","rqVAB");
115 cQ2XYZ("rqVAB","rqxVAB");          mXYZ("rqxVAB",0.01,1.0,0.4,0.2,"P2x","P2y");
116
117 // AVxVB>>AB
118 cRM_Transpose("erVA","erAV");
119 cRM_Dot("erAV","erVB","erAVB");
120 cRM2RPY2("erAVB","reAVB");          vRPY("reAVB","AVR.VBR>>ABR",-300,P3y);
121 cRM2XYZ("erAVB","rxAVB");          mXYZ("rxAVB",0.003,1.0,0.4,1.2,"P3x","P3y");
122
123 cQ_Conjugate("aqVA","aqAV");
124 cQ_Product("aqAV","aqVB","aqAVB");
125 cQ2XYZ("aqAVB","qxAVB");          mXYZ("qxAVB",0.008,1.0,0.4,0.3,"P3x","P3y");
126 cQ_Conjugate("rqVA","rqAV");
127 cQ_Product("rqAV","rqVB","rqAVB");
128 cQ2XYZ("rqAVB","rqxAVB");          mXYZ("rqxAVB",0.01,1.0,0.4,0.2,"P3x","P3y");
129
130 cQ2RPY("rqAVB","qeAVB");          vRPY("qeAVB","VBq x AVq>>ABq",-300,P3y-100);
131
132 //////////////////////////////////////////////////
133 // Function
134 //////////////////////////////////////////////////
135 function ctrlRPY(N,r,p,y)
136 {
137     IV+="c"+N+"R ->"+r+", c"+N+"P ->"+p+", c"+N+"Y ->"+y+", ";
138     DV+="c"+N+"R -> Round[ (ArcTan[Tan[c"+N+"R*DEG2RAD/2]]*2)*RAD2DEG)*1]/1, "+N+"R ->
139     c"+N+"R*DEG2RAD, ";
140     DV+="c"+N+"P -> Round[ (ArcTan[Tan[c"+N+"P*DEG2RAD/2]]*2)*RAD2DEG)*1]/1, "+N+"P ->
141     c"+N+"P*DEG2RAD, ";
142     DV+="c"+N+"Y -> Round[ (ArcTan[Tan[c"+N+"Y*DEG2RAD/2]]*2)*RAD2DEG)*1]/1, "+N+"Y ->
143     c"+N+"Y*DEG2RAD, ";
144 }
145 function ctrlRPY2(N,c,C,r,p,y)

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Page 3 of 7

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215 // AxisAngle -> Rotation Matrix
216 DV+=O+"R11 -> "+N+"Ax^2*(1 - Cos["+N+"Aq]) + Cos["+N+"Aq],";
217 DV+=O+"R12 -> "+N+"Ax*"+N+"Ay*(1 - Cos["+N+"Aq]) - "+N+"Az*Sin["+N+"Aq],";
218 DV+=O+"R13 -> "+N+"Ax*"+N+"Az*(1 - Cos["+N+"Aq]) + "+N+"Ay*Sin["+N+"Aq],";
219 DV+=O+"R21 -> "+N+"Ax*"+N+"Ay*(1 - Cos["+N+"Aq]) + "+N+"Az*Sin["+N+"Aq],";
220 DV+=O+"R22 -> "+N+"Ay^2*(1 - Cos["+N+"Aq]) + Cos["+N+"Aq],";
221 DV+=O+"R23 -> "+N+"Ay*"+N+"Az*(1 - Cos["+N+"Aq]) - "+N+"Ax*Sin["+N+"Aq],";
222 DV+=O+"R31 -> "+N+"Ax*"+N+"Az*(1 - Cos["+N+"Aq]) - "+N+"Ay*Sin["+N+"Aq],";
223 DV+=O+"R32 -> "+N+"Ay*"+N+"Az*(1 - Cos["+N+"Aq]) + "+N+"Ax*Sin["+N+"Aq],";
224 DV+=O+"R33 -> "+N+"Az^2*(1 - Cos["+N+"Aq]) + Cos["+N+"Aq],";
225 }
226
227 function cAA2Q(N,O)
228 {
229 // AxisAngle -> Quaternion
230 DV+=O+"q1 -> Cos["+N+"Aq/2],";
231 DV+=O+"q2 -> -"+N+"Ax*Sin["+N+"Aq/2],";
232 DV+=O+"q3 -> -"+N+"Ay*Sin["+N+"Aq/2],";
233 DV+=O+"q4 -> -"+N+"Az*Sin["+N+"Aq/2],";
234 }
235
236 function cQ2RM(N,O)
237 {
238 // Quaternion -> Rotation Matrix
239 DV+=O+"R11 -> 2*"+N+"q1^2 - 1 + 2*"+N+"q2^2,";
240 DV+=O+"R12 -> 2*("+N+"q2*"+N+"q3 + "+N+"q1*"+N+"q4),";
241 DV+=O+"R13 -> 2*("+N+"q2*"+N+"q4 - "+N+"q1*"+N+"q3),";
242 DV+=O+"R21 -> 2*("+N+"q2*"+N+"q3 - "+N+"q1*"+N+"q4),";
243 DV+=O+"R22 -> 2*"+N+"q1^2 - 1 + 2*"+N+"q3^2,";
244 DV+=O+"R23 -> 2*("+N+"q3*"+N+"q4 + "+N+"q1*"+N+"q2),";
245 DV+=O+"R31 -> 2*("+N+"q2*"+N+"q4 + "+N+"q1*"+N+"q3),";
246 DV+=O+"R32 -> 2*("+N+"q3*"+N+"q4 - "+N+"q1*"+N+"q2),";
247 DV+=O+"R33 -> 2*"+N+"q1^2 - 1 + 2*"+N+"q4^2,";
248 }
249
250 function cQ2RPY(N,O)
251 {
252 // Quaternion -> RPY
253 DV+=O+"R -> ArcTan[2*"+N+"q1^2 - 1 + 2*"+N+"q4^2,2*("+N+"q3*"+N+"q4 - "+N+"q1*"+N+"q2)],";
254 DV+=O+"P -> -ArcSin[2*("+N+"q2*"+N+"q4 + "+N+"q1*"+N+"q3)],";
255 DV+=O+"Y -> ArcTan[2*"+N+"q1^2 - 1 + 2*"+N+"q2^2,2*("+N+"q2*"+N+"q3 - "+N+"q1*"+N+"q4)],";
256 DV+="d"+O+"R -> "+O+"R*RAD2DEG,";
257 DV+="d"+O+"P -> "+O+"P*RAD2DEG,";
258 DV+="d"+O+"Y -> "+O+"Y*RAD2DEG,";
259 }
260
261 //////////////////////////////////////
262 function cRM_BsABxA(A,AB,B)
263 {
264 //B = AB.A
265 DV+=B+"x -> "+AB+"R11*"+A+"x + "+AB+"R12*"+A+"y + "+AB+"R13*"+A+"z,";
266 DV+=B+"y -> "+AB+"R21*"+A+"x + "+AB+"R22*"+A+"y + "+AB+"R23*"+A+"z,";
267 DV+=B+"z -> "+AB+"R31*"+A+"x + "+AB+"R32*"+A+"y + "+AB+"R33*"+A+"z,";
268 }
269
270 function cRM_Transpose(AB,BA)
271 {
272 //BA = ABt
273 DV+=BA+"R11 -> "+AB+"R11,";
274 DV+=BA+"R12 -> "+AB+"R21,";
275 DV+=BA+"R13 -> "+AB+"R31,";
276 DV+=BA+"R21 -> "+AB+"R12,";
277 DV+=BA+"R22 -> "+AB+"R22,";
278 DV+=BA+"R23 -> "+AB+"R32,";
279 DV+=BA+"R31 -> "+AB+"R13,";
280 DV+=BA+"R32 -> "+AB+"R23,";
281 DV+=BA+"R33 -> "+AB+"R33,";
282 }
283
284 function cRM_Dot(AB,BC,AC)
285 {
286 //AC = AB.BC
287 DV+=AC+"R11 -> "+AB+"R11*"+BC+"R11 + "+AB+"R12*"+BC+"R21 + "+AB+"R13*"+BC+"R31,";
288 DV+=AC+"R12 -> "+AB+"R11*"+BC+"R12 + "+AB+"R12*"+BC+"R22 + "+AB+"R13*"+BC+"R32,";

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289 DV+=AC+"R13 -> "+AB+"R11*" +BC+"R13 + "+AB+"R12*" +BC+"R23 + "+AB+"R13*" +BC+"R33, ";
290 DV+=AC+"R21 -> "+AB+"R21*" +BC+"R11 + "+AB+"R22*" +BC+"R21 + "+AB+"R23*" +BC+"R31, ";
291 DV+=AC+"R22 -> "+AB+"R21*" +BC+"R12 + "+AB+"R22*" +BC+"R22 + "+AB+"R23*" +BC+"R32, ";
292 DV+=AC+"R23 -> "+AB+"R21*" +BC+"R13 + "+AB+"R22*" +BC+"R23 + "+AB+"R23*" +BC+"R33, ";
293 DV+=AC+"R31 -> "+AB+"R31*" +BC+"R11 + "+AB+"R32*" +BC+"R21 + "+AB+"R33*" +BC+"R31, ";
294 DV+=AC+"R32 -> "+AB+"R31*" +BC+"R12 + "+AB+"R32*" +BC+"R22 + "+AB+"R33*" +BC+"R32, ";
295 DV+=AC+"R33 -> "+AB+"R31*" +BC+"R13 + "+AB+"R32*" +BC+"R23 + "+AB+"R33*" +BC+"R33, ";
296 }
297
298 function cQ_Conjugate(AB,BA)
299 {
300     //BAq = ABq*
301     DV+=BA+"q1 -> "+AB+"q1, ";
302     DV+=BA+"q2 -> -"+AB+"q2, ";
303     DV+=BA+"q3 -> -"+AB+"q3, ";
304     DV+=BA+"q4 -> -"+AB+"q4, ";
305 }
306
307 function cQ_Product(AB,BC,AC)
308 {
309     //ACq = BCq⊗ABq
310     DV+=AC+"q1 -> "+BC+"q1*" +AB+"q1 - "+BC+"q2*" +AB+"q2 - "+BC+"q3*" +AB+"q3 -
311     "+BC+"q4*" +AB+"q4, ";
312     DV+=AC+"q2 -> "+BC+"q1*" +AB+"q2 + "+BC+"q2*" +AB+"q1 + "+BC+"q3*" +AB+"q4 -
313     "+BC+"q4*" +AB+"q3, ";
314     DV+=AC+"q3 -> "+BC+"q1*" +AB+"q3 - "+BC+"q2*" +AB+"q4 + "+BC+"q3*" +AB+"q1 +
315     "+BC+"q4*" +AB+"q2, ";
316     DV+=AC+"q4 -> "+BC+"q1*" +AB+"q4 + "+BC+"q2*" +AB+"q3 - "+BC+"q3*" +AB+"q2 +
317     "+BC+"q4*" +AB+"q1, ";
318 }
319
320 function cQ_BsABxA(A,AB,B)
321 {
322     //BV = ABQqAV⊗ABq*
323     DV+=B+"x -> (1 - 2*" +AB+"q3*" +AB+"q3 - 2*" +AB+"q4*" +AB+"q4) *" +A+"x + (
324     2*" +AB+"q2*" +AB+"q3 - 2*" +AB+"q1*" +AB+"q4) *" +A+"y + ( 2*" +AB+"q1*" +AB+"q3 +
325     2*" +AB+"q2*" +AB+"q4) *" +A+"z, ";
326     DV+=B+"y -> ( 2*" +AB+"q2*" +AB+"q3 + 2*" +AB+"q1*" +AB+"q4) *" +A+"x + (1 -
327     2*" +AB+"q2*" +AB+"q2 - 2*" +AB+"q4*" +AB+"q4) *" +A+"y + ( 2*" +AB+"q3*" +AB+"q4 -
328     2*" +AB+"q1*" +AB+"q2) *" +A+"z, ";
329     DV+=B+"z -> ( 2*" +AB+"q2*" +AB+"q4 - 2*" +AB+"q1*" +AB+"q3) *" +A+"x + (
330     2*" +AB+"q1*" +AB+"q2 + 2*" +AB+"q3*" +AB+"q4) *" +A+"y + (1 - 2*" +AB+"q2*" +AB+"q2 -
331     2*" +AB+"q3*" +AB+"q3) *" +A+"z, ";
332 }
333
334 //////////////////////////////////////////////////
335 function cRM2XYZ(N,O)
336 {
337     // Rotation Matrix -> XYZ
338     cRM_BsABxA("XE",N,"X"+O);
339     cRM_BsABxA("YE",N,"Y"+O);
340     cRM_BsABxA("ZE",N,"Z"+O);
341 }
342
343 function cQ2XYZ(N,O)
344 {
345     // Quaternion -> XYZ
346     cQ_Conjugate(N,"t"+N);
347     cQ_BsABxA("XE","t"+N,"X"+O);
348     cQ_BsABxA("YE","t"+N,"Y"+O);
349     cQ_BsABxA("ZE","t"+N,"Z"+O);
350 }
351
352 //////////////////////////////////////////////////
353 function vCtrlRPY(N,h)
354 {
355     IP+="Thickness[.0005],RGBColor[.0,.0,.0],Text[\""+N+"\",{-240,\"+(h)+\",0},{0,0}],\";
356     IP+="\"RGBColor[1.,.0,.0],Line[{ {-180,\"+(h+10)+\",0},{180,\"+(h+10)+\",0}},{c\"+N+\"R,
357     \"+(h+10)+\",0}],Text[c\"+N+\"R,{-180,\"+(h+10)+\",0},{2,0}],\";
358     IP+="\"RGBColor[.0,1.,.0],Line[{ {-180,\"+(h+10)+\",0},{180,\"+(h+10)+\",0}},{c\"+N+\"R,
359     \"+(h+10)+\",0}],Text[c\"+N+\"R,{-180,\"+(h+10)+\",0},{2,0}],\";
360 }

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354     )+",0]}}],Point[{c"+N+"P,"+(h      )+",0}],Text[c"+N+"P,{-180,"+(h      )+",0},{2,0}],";
IP+="RGBColor[.0,.0,1.],Line[{ {-180,"+(h-10)+",0},{180,"+(h-10)+",0} }],Point[{c"+N+"Y,
"+(h-10)+",0}],Text[c"+N+"Y,{-180,"+(h-10)+",0},{2,0}],";
355 }
356
357 function vRotationMatrix(N,V,w,h)
358 {
359     DV+="t"+N+"R11 -> Round["+N+"R11*100]/100,";
360     DV+="t"+N+"R12 -> Round["+N+"R12*100]/100,";
361     DV+="t"+N+"R13 -> Round["+N+"R13*100]/100,";
362     DV+="t"+N+"R21 -> Round["+N+"R21*100]/100,";
363     DV+="t"+N+"R22 -> Round["+N+"R22*100]/100,";
364     DV+="t"+N+"R23 -> Round["+N+"R23*100]/100,";
365     DV+="t"+N+"R31 -> Round["+N+"R31*100]/100,";
366     DV+="t"+N+"R32 -> Round["+N+"R32*100]/100,";
367     DV+="t"+N+"R33 -> Round["+N+"R33*100]/100,";
368
369     IP+="Thickness[.0005],RGBColor[.0,.0,.0],";
370     IP+="Text[\""+V+"\",{"+"w+", "+"h"+1.5*dd,0}],";
371     IP+="Line[{ {"+w+"-1.6*dd,"+h"+1.2*dd,0},{ "+w+"-1.6*dd,"+h"+-1.2*dd,0} }],";
372     IP+="Line[{ {"+w"+1.6*dd,"+h"+1.2*dd,0},{ "+w"+1.6*dd,"+h"+-1.2*dd,0} }],";
373     IP+="Text[t"+N+"R11,{ "+w+"-dd,"+h"+dd,0}],";
374     IP+="Text[t"+N+"R12,{ "+w+"+ 0,"+h"+dd,0}],";
375     IP+="Text[t"+N+"R13,{ "+w"+dd,"+h"+dd,0}],";
376     IP+="Text[t"+N+"R21,{ "+w+"-dd,"+h"++ 0,0}],";
377     IP+="Text[t"+N+"R22,{ "+w"++ 0,"+h"++ 0,0}],";
378     IP+="Text[t"+N+"R23,{ "+w"+dd,"+h"++ 0,0}],";
379     IP+="Text[t"+N+"R31,{ "+w+"-dd,"+h"+-dd,0}],";
380     IP+="Text[t"+N+"R32,{ "+w"++ 0,"+h"+-dd,0}],";
381     IP+="Text[t"+N+"R33,{ "+w"+dd,"+h"+-dd,0}],";
382 }
383
384 function vRPY(N,V,w,h)
385 {
386     DV+="t"+N+"R -> Round[d"+N+"R*100]/100,";
387     DV+="t"+N+"P -> Round[d"+N+"P*100]/100,";
388     DV+="t"+N+"Y -> Round[d"+N+"Y*100]/100,";
389
390     IP+="Thickness[.0005],RGBColor[.0,.0,.0],";
391     IP+="Text[\""+V+"\",{"+"w+", "+"h"+1.5*dd,0}],";
392     IP+="Line[{ {"+w+"-0.7*dd,"+h"+1.2*dd,0},{ "+w+"-0.7*dd,"+h"+-1.2*dd,0} }],";
393     IP+="Line[{ {"+w"+0.7*dd,"+h"+1.2*dd,0},{ "+w"+0.7*dd,"+h"+-1.2*dd,0} }],";
394     IP+="Text[t"+N+"R,{ "+w+", "+"h"+dd,0}],";
395     IP+="Text[t"+N+"P,{ "+w+", "+"h"++ 0,0}],";
396     IP+="Text[t"+N+"Y,{ "+w+", "+"h"+-dd,0}],";
397 }
398
399 function vAxisAngle(N,V,w,h)
400 {
401     DV+="t"+N+"Aq -> Floor["+N+"Aq*RAD2DEG *100]/100,";
402     DV+="t"+N+"Ax -> Floor["+N+"Ax*100]/100,";
403     DV+="t"+N+"Ay -> Floor["+N+"Ay*100]/100,";
404     DV+="t"+N+"Az -> Floor["+N+"Az*100]/100,";
405
406     IP+="Thickness[.0005],RGBColor[.0,.0,.0],";
407     IP+="Text[\""+V+"\",{"+"w+", "+"h"+1.5*dd,0}],";
408     IP+="Line[{ {"+w+"-2.1*dd,"+h"+0.5*dd,0},{ "+w+"-2.1*dd,"+h"+-0.5*dd,0} }],";
409     IP+="Line[{ {"+w"+2.1*dd,"+h"+0.5*dd,0},{ "+w"+2.1*dd,"+h"+-0.5*dd,0} }],";
410     IP+="Text[Q ,{"+"w+"-1.5*dd,"+h"+15,0}],";
411     IP+="Text[rx,{ "+w+"-0.5*dd,"+h"+15,0}],";
412     IP+="Text[ry,{ "+w"+0.5*dd,"+h"+15,0}],";
413     IP+="Text[rz,{ "+w"+1.5*dd,"+h"+15,0}],";
414     IP+="Text[t"+N+"Aq,{ "+w+"-1.5*dd,"+h"+0}],";
415     IP+="Text[t"+N+"Ax,{ "+w+"-0.5*dd,"+h"+0}],";
416     IP+="Text[t"+N+"Ay,{ "+w"+0.5*dd,"+h"+0}],";
417     IP+="Text[t"+N+"Az,{ "+w"+1.5*dd,"+h"+0}],";
418 }
419
420 function vQuaternion(N,V,w,h)
421 {
422     DV+="t"+N+"q1 -> Floor["+N+"q1*100]/100,";
423     DV+="t"+N+"q2 -> Floor["+N+"q2*100]/100,";
424     DV+="t"+N+"q3 -> Floor["+N+"q3*100]/100,";
425     DV+="t"+N+"q4 -> Floor["+N+"q4*100]/100,";
426
427     IP+="Thickness[.0005],RGBColor[.0,.0,.0],";

```

```

428 IP+="Text[\""+V+"\",{ "+w+", "+h"+1.5*dd,0}],";
429 IP+="Line[{{ "+w+"-2.1*dd, "+h"+0.5*dd,0},{ "+w+"-2.1*dd, "+h"+-0.5*dd,0}]],";
430 IP+="Line[{{ "+w+"+2.1*dd, "+h"+0.5*dd,0},{ "+w+"+2.1*dd, "+h"+-0.5*dd,0}]],";
431 IP+="Text[q1,{ "+w+"-1.5*dd, "+h"+15,0}],";
432 IP+="Text[q2,{ "+w+"-0.5*dd, "+h"+15,0}],";
433 IP+="Text[q3,{ "+w"+0.5*dd, "+h"+15,0}],";
434 IP+="Text[q4,{ "+w"+1.5*dd, "+h"+15,0}],";
435 IP+="Text[t"+N+"q1,{ "+w+"-1.5*dd, "+h"+0}],";
436 IP+="Text[t"+N+"q2,{ "+w+"-0.5*dd, "+h"+0}],";
437 IP+="Text[t"+N+"q3,{ "+w"+0.5*dd, "+h"+0}],";
438 IP+="Text[t"+N+"q4,{ "+w"+1.5*dd, "+h"+0}],";
439 }
440
441 //////////////////////////////////////////////////
442 function mXYZ(N,border,e,c,scale,w,h)
443 {
444     IP+="Thickness["+border+"],";
445     IP+="RGBColor["+e+", "+c+", "+c+"],Line[{{ "+w+", "+h+",0},{ "+w+"+"+scale+"*X"+N+"x, "+h+"+"+
446         "+scale+"*X"+N+"y, "+scale+"*X"+N+"z}]],";
447     IP+="RGBColor["+c+", "+e+", "+c+"],Line[{{ "+w+", "+h+",0},{ "+w+"+"+scale+"*Y"+N+"x, "+h+"+"+
448         "+scale+"*Y"+N+"y, "+scale+"*Y"+N+"z}]],";
449     IP+="RGBColor["+c+", "+c+", "+e+],Line[{{ "+w+", "+h+",0},{ "+w+"+"+scale+"*Z"+N+"x, "+h+"+"+
450         "+scale+"*Z"+N+"y, "+scale+"*Z"+N+"z}]],";
451 }
452 //////////////////////////////////////////////////
453 //http://rmath.com
454 /**/GOG="<APPLET width=100% height=100% archive=live.jar code=Live.class><PARAM
NAME='MOUSE_DRAG_ACTION' VALUE='NONE'><PARAM NAME=INDEPENDENT_VARIABLES
VALUE='{ "+IV+"}'><PARAM NAME='DEPENDENT_VARIABLES' VALUE='{ "+DV+"}'><PARAM
NAME='MAGNIFICATION' VALUE='1'><PARAM NAME='INPUT' VALUE='Graphics3D[["+IP+"],ViewPoint ->
{0,0,10},ViewVertical -> {0,1,0},SphericalRegion -> True,Boxed -> False,Axes ->
False,PlotRange -> {{-300,300},{-300,300},{-50,50}},Lighting -> False]'></APPLET>";
455 P.innerHTML=GOG;
456 //Animate[, {t,0,600,0.0465}]
457 //
458 </SCRIPT></BODY>

```