

Unit bivectors figures in R3. unitBivectorsFig1.eps, unitBivectorsFig2.eps

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In[1]:= << peeters` ;
peeters`setGitDir["../project/figures/GAelectrodynamics"]

Out[2]= /Users/pjoot/project/figures/GAelectrodynamics

In[56]:= ClearAll[e1, e2, e3, o, esub, etext, bivectors, arc]
o = {0, 0, 0};
{e1, e2, e3} = IdentityMatrix[3];
esub = Style[Subscript[Style["e", Bold], #], FontSize -> 16] &;
etext[i_, o_] := Text[esub[i], 0.5 IdentityMatrix[3][[i]] + o];
etext[i_, j_, p_] := Text[Row[{esub[i], esub[j]}], p];
(*sign doesn't work out: *)
(*arc[origin_, v1_, v2_, r_,c_, s_] :=
ParametricPlot3D[origin + r(v1 Cos[theta] + v2 Sin[theta]),
{theta, 0, s(2 Pi-0.1)}] /.Line[x_]>{Arrowheads[0.04],c,Arrow[Tube[x]]}
*)
(* this arc is a generalization of : https://stackoverflow.com/a/5705490/189270
The arrowhead looks a little weird
though (it's not tangent to the direction of the circle)
*)
arc[origin_, v1_, v2_, r_, c_, limit_, a_] :=
Graphics3D[{c, Arrowheads[a], Arrow[Tube[
Table[origin + r (v1 Cos[t] + v2 Sin[t]), {t, 0, limit, Sign[limit] Pi / 100}]]}]
(*arc[o,e1, e2,0.3, Black, 2Pi - 0.2]
arc[o,e1, e2,0.3, Black, -(2Pi - 0.2)]*)

bivectors[i1_, i2_, i3_, i4_, i5_, i6_, sign_] :=
Module[{s, t, ta, i, offset, arcrange},
i = IdentityMatrix[3];
s = 100;
t = 0.01;
ta = 0.05;
offset = 0.25;
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arcrange = sign (2 Pi - 0.2);
Show[{

Graphics3D[{

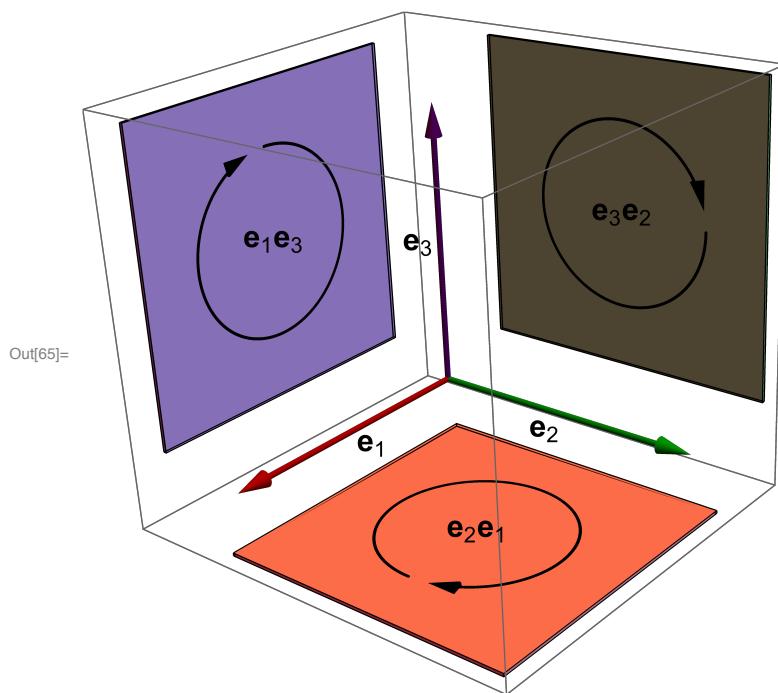
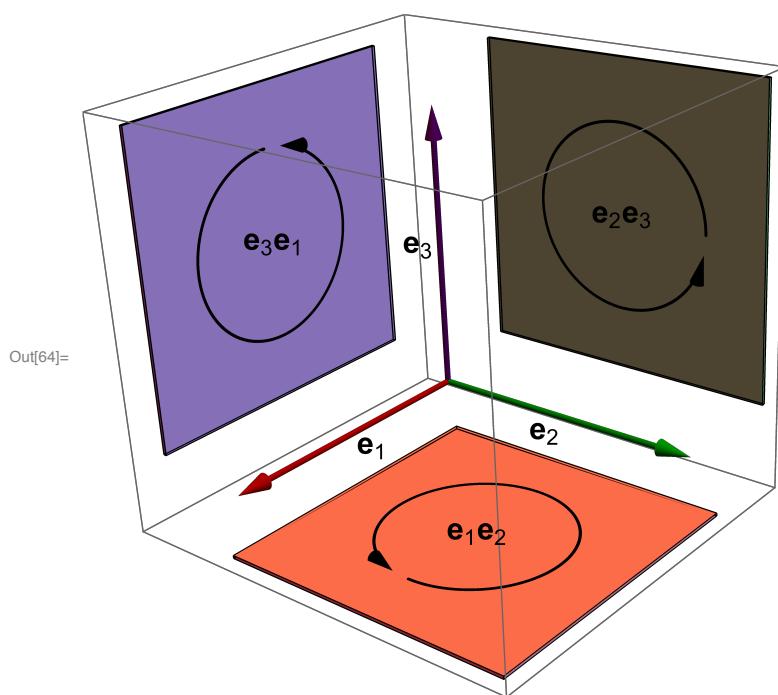
  Arrowheads[ta],
  Red // Lighter // Lighter,
  Parallelepiped[offset (e1 + e2), {i[[i1]], i[[i2]], -e3 / s}],
  Red // Darker,
  Arrow[Tube[{o, e1}, t]],
  (*Arrow[Tube[{e1,e1+e2}, t]],*)
  Green // Lighter // Lighter,
  Parallelepiped[offset (e2 + e3), {i[[i3]], i[[i4]], -e1 / s}],
  Green // Darker,
  Arrow[Tube[{o, e2}, t]],
  (*Arrow[Tube[{e2,e2+e3}, t]],*)
  Purple // Lighter // Lighter,
  Parallelepiped[offset (e3 + e1), {i[[i5]], i[[i6]], -e2 / s}],
  Purple // Darker,
  Arrow[Tube[{o, e3}, t]],
  (*Arrow[Tube[{e3,e3+e1}, t]],*)
  Black,
  etext[1, 0.1 e2],
  etext[2, 0.1 e1],
  etext[3, -0.1 e2],
  etext[i1, i2, (0.5 + offset) (e1 + e2)],
  etext[i3, i4, (0.5 + offset) (e2 + e3)],
  etext[i5, i6, (0.5 + offset) (e3 + e1)]
}],

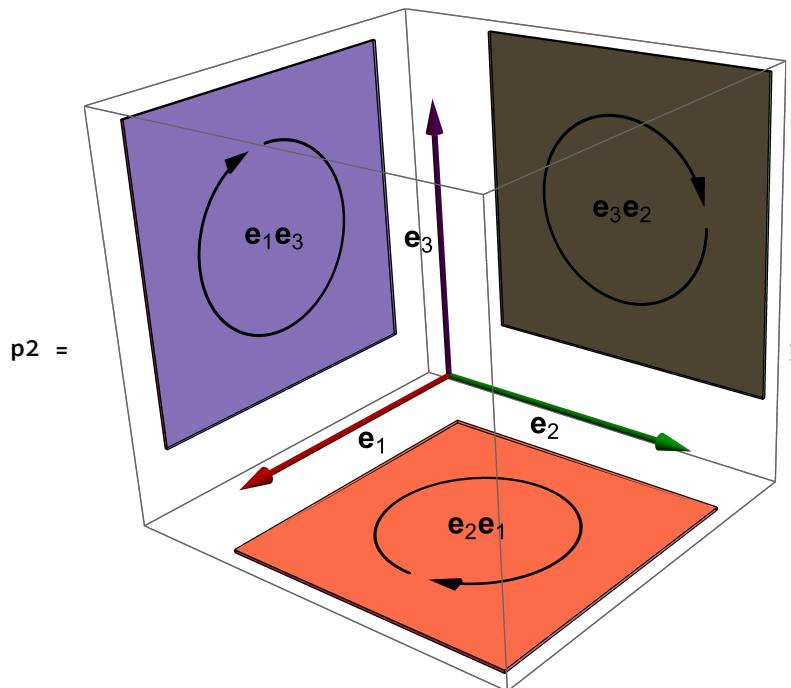
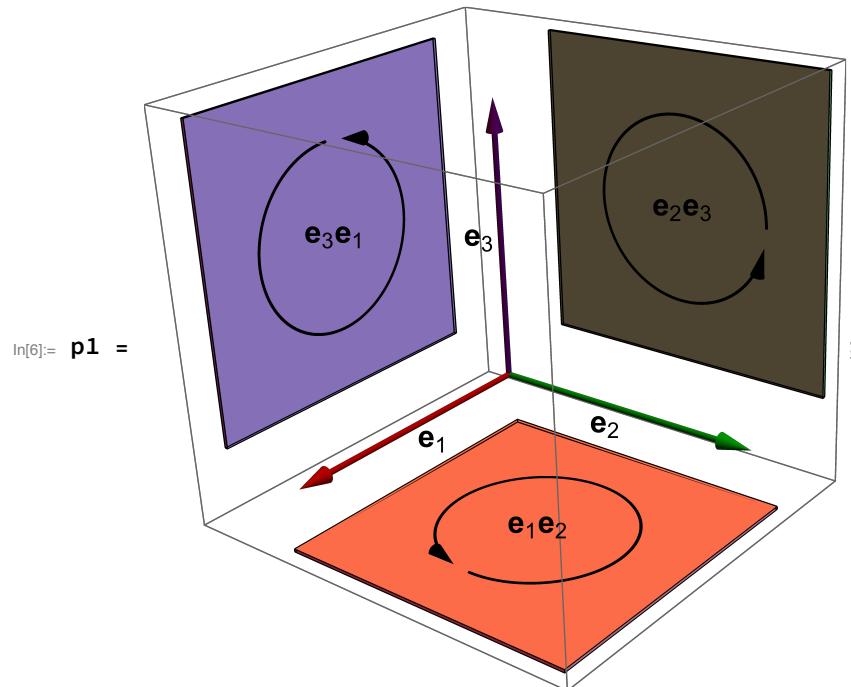

  arc[(0.5 + offset) (e1 + e2), e1, e2, 0.3, Black, arcrange, 0.04],
  arc[(0.5 + offset) (e2 + e3), e2, e3, 0.3, Black, arcrange, 0.04],
  arc[(0.5 + offset) (e3 + e1), e3, e1, 0.3, Black, arcrange, 0.04]
}]

]

bivectors[1, 2, 2, 3, 3, 1, 1]
bivectors[2, 1, 3, 2, 1, 3, -1]

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In[8]:= peeters`exportForLatex["unitBivectorsFig1", p1]
peeters`exportForLatex["unitBivectorsFig2", p2]

Out[8]= {unitBivectorsFig1.eps, unitBivectorsFig1pn.png}

Out[9]= {unitBivectorsFig2.eps, unitBivectorsFig2pn.png}

In[82]:= bivectorsDisk[i1_, i2_, i3_, i4_, i5_, i6_, sign_] :=
Module[{s, t, ta, i, offset, arcrange, radius},

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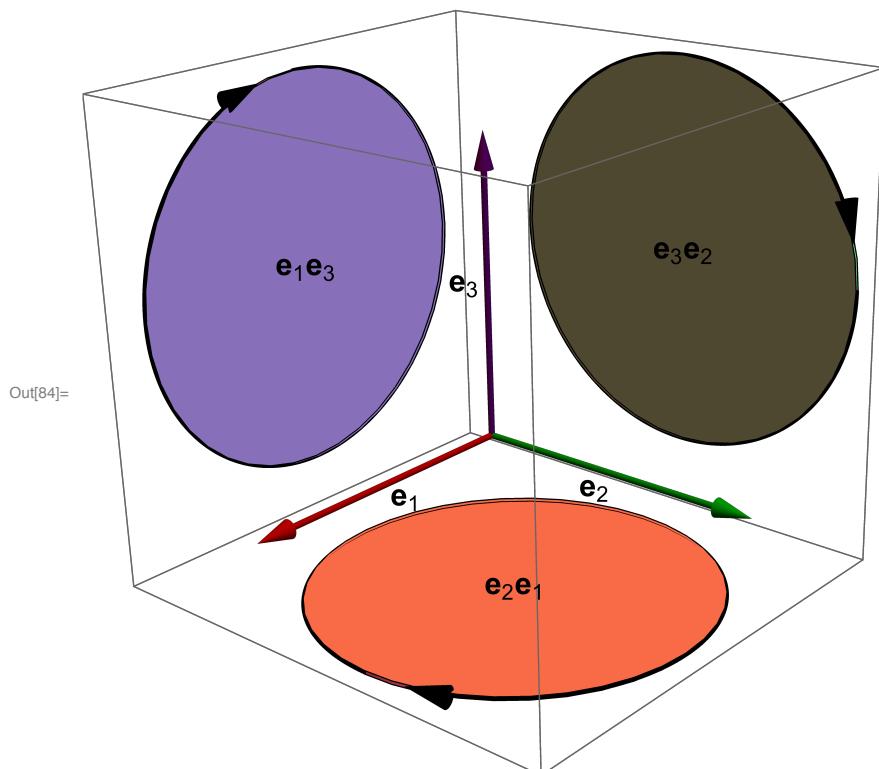
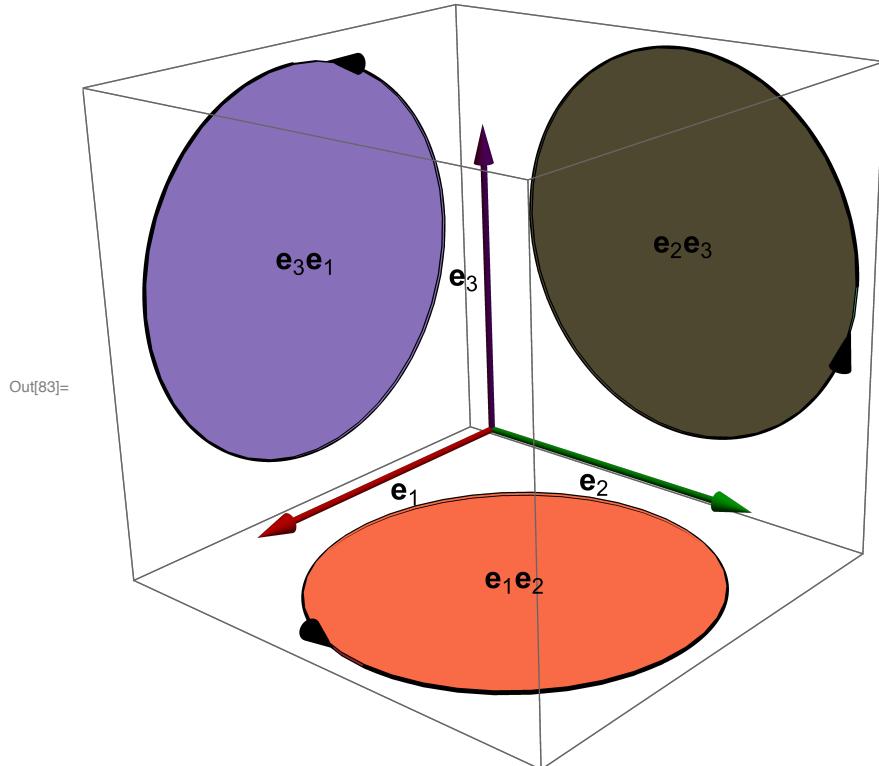
```

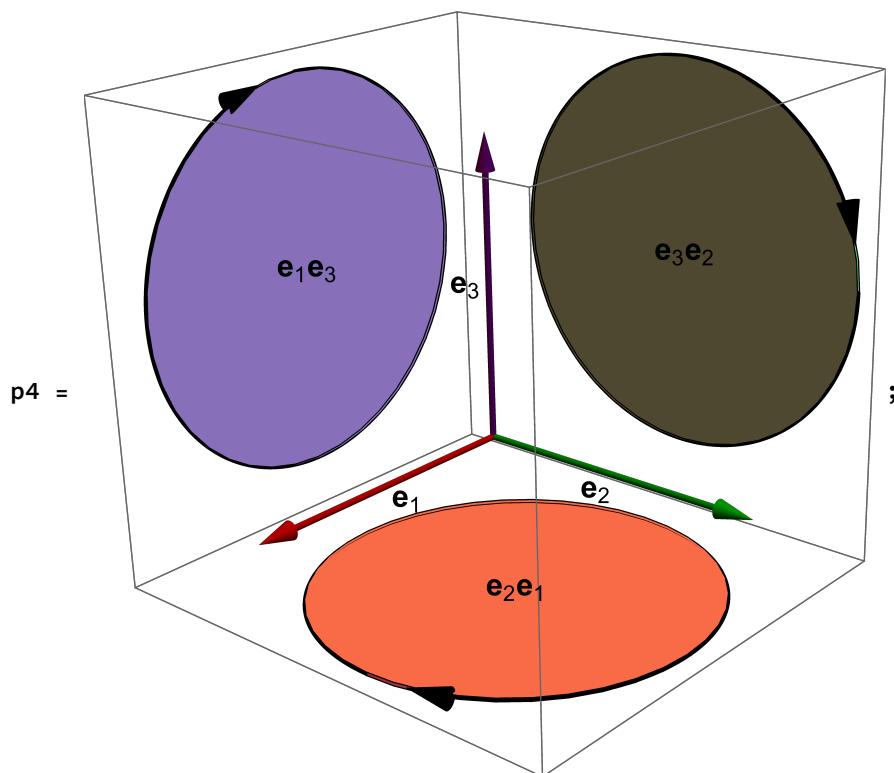
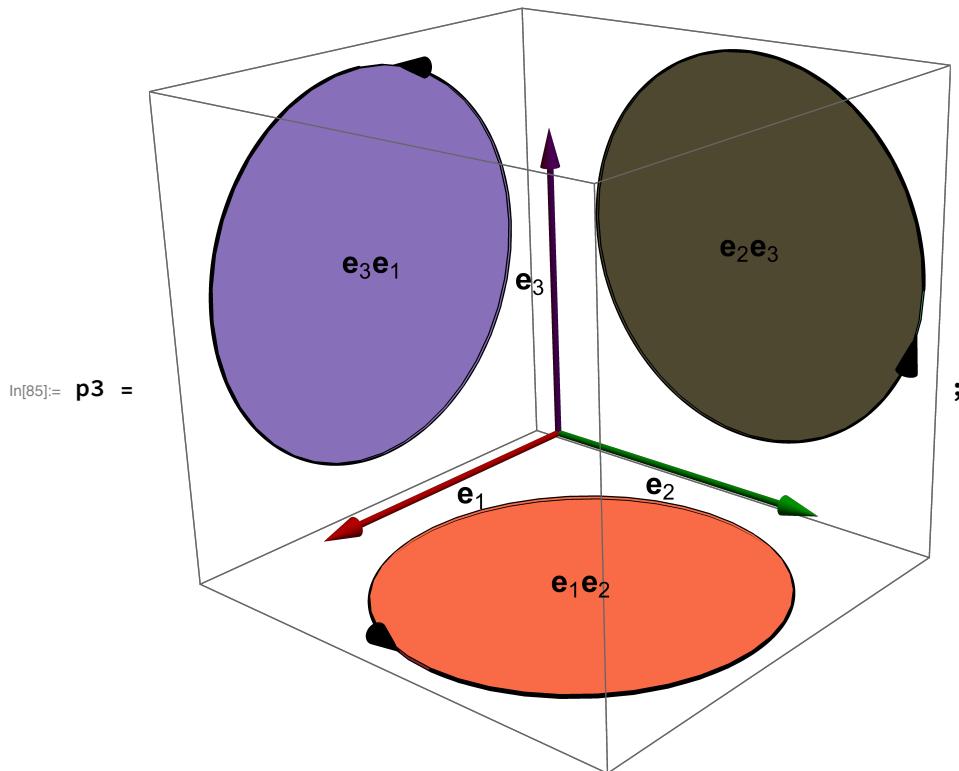
i = IdentityMatrix[3];
s = 200;
t = 0.01;
ta = 0.05;
offset = 0.25;
radius = 1/Sqrt[Pi];
arcrange = sign (2 Pi - 0.2);
Show[{

Graphics3D[{
  Arrowheads[ta],
  Red // Lighter // Lighter,
  Cylinder[
    {(0.5 + offset) (e1 + e2) - e3 / s, (0.5 + offset) (e1 + e2) + e3 / s}, radius],
  Red // Darker,
  Arrow[Tube[{o, e1}, t]],
  (*Arrow[Tube[{e1,e1+e2}, t]],*)
  Green // Lighter // Lighter,
  Cylinder[
    {(0.5 + offset) (e2 + e3) - e1 / s, (0.5 + offset) (e2 + e3) + e1 / s}, radius],
  Green // Darker,
  Arrow[Tube[{o, e2}, t]],
  (*Arrow[Tube[{e2,e2+e3}, t]],*)
  Purple // Lighter // Lighter,
  Cylinder[
    {(0.5 + offset) (e1 + e3) - e2 / s, (0.5 + offset) (e1 + e3) + e2 / s}, radius],
  Purple // Darker,
  Arrow[Tube[{o, e3}, t]],
  (*Arrow[Tube[{e3,e3+e1}, t]],*)
  Black,
  etext[1, 0.1 e2],
  etext[2, 0.1 e1],
  etext[3, -0.1 e2],
  etext[i1, i2, (0.5 + offset) (e1 + e2)],
  etext[i3, i4, (0.5 + offset) (e2 + e3)],
  etext[i5, i6, (0.5 + offset) (e3 + e1)]
  }],
  arc[(0.5 + offset) (e1 + e2), e1, e2, radius, Black, arcrange, 0.05],
  arc[(0.5 + offset) (e2 + e3), e2, e3, radius, Black, arcrange, 0.05],
  arc[(0.5 + offset) (e3 + e1), e3, e1, radius, Black, arcrange, 0.05]
}]
]

bivectorsDisk[1, 2, 2, 3, 3, 1, 1]

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peeters`exportForLatex["unitBivectorsFig3", p3]
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```
peeters`exportForLatex["unitBivectorsFig4", p4]
Out[87]= {unitBivectorsFig3.eps, unitBivectorsFig3pn.png}
Out[88]= {unitBivectorsFig4.eps, unitBivectorsFig4pn.png}
```

junk