

Listing 1: example.psm

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1  %-----%
2  %---Helix curve (parametrized on arc lenght)-----%
3  %---and intrinsic vectors-----%
4  %-----%
5  DEF helix (a,b::IsReal) = <K:a * cos ~ u, K:a * sin ~ u, K:b *
   u>
6  WHERE
7    u = ID / SQRT ~ K:(a*a + b*b)
8  END;
9
10 DEF helixTangent (a,b::IsReal) = AA:D:(helix:<a,b>);
11 DEF helixNormal (a,b::IsReal) =
12   K:((a*a + b*b)/a) scalarVectProd AA:(D ~ D):(helix:<a,b>);
13 DEF helixBinormal (a,b::IsReal) = helixTangent:<a,b> VectProd
   helixNormal:<a,b>;
14
15 DEF helixCurvatureCenter (a,b::IsReal) =
16   helix:<a,b> vectSum (K:((sqr:a + sqr:b)/a) scalarVectProd
   helixNormal:<a,b>) ;
17
18 DEF helixOsculCircle (a,b,s::IsReal) =
19   (T:<1,2,3>:center ~ Rotn:<angle, axis>):circle
20 WHERE
21   circle = MAP:((circle3D ~ radius):<a,b, s>):(intervals:(2*PI
   ):24),
22   angle = (- ~ ACOS ~ InnerProd):<ortho,<0,0,1>>,
23   axis = CONS:(helixNormal:<a,b>):s,
24   center = CONS:(helixCurvatureCenter:<a,b>):s,
25   ortho = CONS:(helixBinormal:<a,b>):s
26 END;
27 DEF circle3D (r::IsReal) = [K:r * COS, K:r * SIN, K:0] ~ s1;
28 DEF radius (a,b,s::IsReal) = (VectNorm ~ VectDiff):
   < CONS:(helix:<a,b>):s, CONS:(helixCurvatureCenter:<a,b>):s
   >;
29 DEF CurveGraph (f::IsSeqOf:IsFun) = MAP:(CONS:f ~ s1):(
   intervals:(6*PI):90);
30
31
32 DEF assembly = STRUCT:<
33   (CurveGraph ~ helix):<1,2>,
34   (CurveGraph ~ helixCurvatureCenter):<1,2>,
35   (JOIN ~ helixOsculCircle):<1,2, 2*PI>
36 >;
37 DEF out = (STRUCT ~ [ID, BOX:<1,2>]):assembly

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