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plots[tubeplot] - three-dimensional tube plotting

Calling Sequence:

tubeplot(C, options);

Parameters:

C - a set of spacecurves

Description:

- The tubeplot function defines a tube about one or more three-dimensional space curves. A given space curve is a list of three or more components. The initial three components define parametrically the x, y, and z components. Additional components of a given space curve specify various local attributes of the curve.
- Remaining components of an individual space curve are interpreted as local options which are specified as equations of the form option = value. These include equations of the form numpoints = n or tubepoints = m with n and m integers. These allow the user to designate the number of points evaluated on the space curve and the number of points on the tube, respectively. The default values used by Maple are numpoints=50 and tubepoints=10. An equation of the form radius = f, where f is some expression, defines the radius of the tube about the given space curve. If no radius is specified, then the default used is radius=1. An equation of the form t=a..b, where a and b evaluate to constants, specifies the range of the parameter of the curve.
- Remaining arguments to tubeplot include such specifications as numpoints = n, tubepoints = m, t= a..b, and radius = f. These are to be used in the case where an individual space curve does not have the option specified.
- Additional options are the same as those found in spacecurve (and similar to options for plot3d). For example, the option axes= BOXED specifies that the tubeplot is to include a boxed axis bounding the plot. See also ?plot3d[options] .
- The result of a call to tubeplot is a PLOT3D structure which can be rendered by the plotting device. The user may assign a PLOT3D value to a variable, save it in a file, then read it back in for redisplay. See ?plot3d[structure] .
- tubeplot may be defined by with(plots) or with(plots,tubeplot). It can also be used by the name plots[tubeplot] .

Examples:

```
> with(plots):
tubeplot([cos(t), sin(t), 0], t=0..2*Pi, radius=0.5);
tubeplot([cos(t), sin(t), 0], t=Pi..2*Pi, radius=0.25*(t-Pi));
tubeplot([3*sin(t), t, 3*cos(t)], t=-3*Pi..4*Pi, radius=1.2+sin(t),
numpoints=80);
tubeplot([sin(t), t, exp(t)], t=-1..1, radius=cos(t), tubepoints=20)
;
tubeplot([ -10*cos(t) - 2*cos(5*t) + 15*sin(2*t),
-15*cos(2*t) + 10*sin(t) - 2*sin(5*t),
10*cos(3*t) ], t= 0..2*Pi, radius=3*cos(t*Pi/3));
```

Multiple tubeplots are also allowed

```
> tubeplot({[cos(t), sin(t), 0], [0, sin(t)-1, cos(t)]}, t=0..2*Pi, radius=1/4);
tubeplot({[cos(t), sin(t), 0], [0, sin(t)-1, cos(t)]}, t=0..2*Pi, radius=1/10*t);
tubeplot({[cos(t), sin(t), 0], t=Pi..2*Pi, numpoints=15, radius=0.25*
```

```
(t-Pi)],
```

```
[0,cos(t)-1,sin(t),t=0..2*Pi,numpoints=45,radius=0.25]);
```

Can specify color option as a 2 argument procedure

```
> F := (x,y) ->sin(x):
```

```
tubeplot([cos(t),sin(t),0],[0,sin(t)-1,cos(t)],t=0..2*Pi,radius=1/4,color=F,style=patch);
```

See Also:

[plot3d\[option\]](#), [plot3d\[structure\]](#), [plots\[spacecurve\]](#)

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plots[spacecurve] - plotting of 3d space curves

Calling Sequence:

```
spacecurve(L,options);
```

Parameters:

L - a set of space curves

Description:

- The spacecurve function defines one or more curves in 3 space. The first argument can be a list of points or a spacecurve. A spacecurve is a list of size three or more. The first three components are considered to be the parametric representations of the x, y, and z coordinates. Additional arguments include specifying a range for the particular curve via $t=a..b$, or the number of points that are to be used in drawing the curve via $numpoints=n$ (the default is 50). The first argument can also be a set of such lists, in which case several three-dimensional curves are drawn.
- Remaining arguments are interpreted as options which are specified as equations of the form $option = value$. These can be used to specify global default values such as $t=a..b$ or $numpoints=n$.
- Remaining options are the same as those found in `plot3d` with the exception of specifying a grid size. For example, the option `axes = BOXED` specifies that the space curves include a boxed axis bounding the plot. See also `?plot3d[options]`.
- The result of a call to `spacecurve` is a PLOT3D structure which can be rendered by the plotting device. The user may assign a PLOT3D value to a variable, save it in a file, then read it back in for redisplay. See `?plot3d[structure]`.
- `spacecurve` may be defined by `with(plots)` or `with(plots,spacecurve)`. It can also be used by the name `plots[spacecurve]`.

Examples:

```
> with(plots):
```

```
spacecurve([cos(t),sin(t),t],t=0..4*Pi);
```

```
spacecurve([sin(t),0,cos(t),t=0..2*Pi],[cos(t)+1,sin(t),0,numpoints=10]),
```

```
t=-Pi..Pi,axes=FRAME);
```

```
spacecurve([t*sin(t),t,t*cos(t)],[4*cos(t),4*sin(t),0],t=-Pi..2*Pi);
```

```
knot:= [-10*cos(t) - 2*cos(5*t) + 15*sin(2*t),
```

```
-15*cos(2*t) + 10*sin(t) - 2*sin(5*t), 10*cos(3*t), t=
```

```
0..2*Pi];
```

```
spacecurve(knot);
```

```
helix_points :=  
[seq([10*cos(r/30), 10*sin(r/30), r/3], r=0..240)]:  
spacecurve(helix_points);  
spacecurve({helix_points, knot});
```

See Also:

[read](#), [save](#), [plots\[tubeplot\]](#), [plot3d\[option\]](#), [plot3d\[structure\]](#)