1.4 Asymptotické směry

```
> restart;
> with(LinearAlgebra):
> X:=Vector[row]([x,y,z,1]);
```

$$X := [x, y, z, 1]$$

```
> K:=Matrix(a,1..4,1..4,shape=symmetric);
```

$$K := \begin{bmatrix} a(1,1) & a(1,2) & a(1,3) & a(1,4) \\ a(1,2) & a(2,2) & a(2,3) & a(2,4) \\ a(1,3) & a(2,3) & a(3,3) & a(3,4) \\ a(1,4) & a(2,4) & a(3,4) & a(4,4) \end{bmatrix}$$

```
> Kv:=expand(X.K.Transpose(X))=0;
```

$$Kv := x^2\, a(1,1) + 2\, x\, y\, a(1,2) + 2\, x\, z\, a(1,3) + 2\, x\, a(1,4) + y^2\, a(2,2) + 2\, y\, z\, a(2,3) + 2\, y\, a(2,4) + z^2\, a(3,3) + 2\, z\, a(3,4) + a(4,4) = 0$$

```
> M:=[m,n,p];
```

$$M := [m, n, p]$$

```
> Primka:=[x=m+t*u,y=n+t*v,z=p+t*w];
```

$$Primka := [x = m + t\, u, y = n + t\, v, z = p + t\, w]$$

```
> Kv1:=simplify(eval(Kv,Primka));
```

$$Kv1 := 2\, a(3,4)\, t\, w + 2\, a(1,1)\, m\, t\, u + 2\, a(1,2)\, m\, t\, v + 2\, a(1,2)\, t\, u\, n + 2\, a(1,2)\, t^2\, u\, v + 2\, a(1,3)\, m\, t\, w + 2\, a(1,3)\, t\, u\, p + 2\, a(1,3)\, t^2\, u\, w + 2\, a(2,2)\, n\, t\, v + 2\, a(2,3)\, n\, t\, w + 2\, a(2,3)\, t\, v\, p + 2\, a(2,3)\, t^2\, v\, w + 2\, a(3,3)\, p\, t\, w + a(1,1)\, t^2\, u^2 + 2\, a(1,2)\, m\, n + 2\, a(1,3)\, m\, p + 2\, a(1,4)\, t\, u + a(2,2)\, t^2\, v^2 + 2\, a(2,3)\, n\, p + 2\, a(2,4)\, t\, v + a(3,3)\, t^2\, w^2 + a(4,4) + a(3,3)\, p^2 + 2\, a(3,4)\, p + a(1,1)\, m^2 + 2\, a(1,4)\, m + a(2,2)\, n^2 + 2\, a(2,4)\, n = 0$$

```
> A:=coeff(lhs(Kv1),t^2);
```

$$A := 2\, a(1,2)\, u\, v + 2\, a(1,3)\, u\, w + 2\, a(2,3)\, v\, w + a(1,1)\, u^2 + a(2,2)\, v^2 + a(3,3)\, w^2$$

Příklad:

```
> a(1,1):=1: a(2,2):=1: a(3,3):=0: a(4,4):=-1: a(1,2):=0:
  a(1,3):=0: a(1,4):=0: a(2,3):=0: a(2,4):=0: a(3,4):=0:
> Kv;
```

$$x^2 - 1 + y^2 = 0$$

```
> RovAsSm:=A=0;
```

$$RovAsSm := u^2 + v^2 = 0$$

```
> Res:=solve(RovAsSm,{u,v});
```

$$Res := \{u = v\, I, v = v\}, \{u = -I\, v, v = v\}$$

```
> u:=Vector[row]([0,0,1]);
```

$$u := [0, 0, 1]$$

```
> plotsetup(inline,plotoptions=`portrait,noborder,shrinkby=0`);
> Valec:=plots[implicitplot3d](Kv,x=-1..1,y=-1..1,z=-1..2,axes=fra
  me,color=COLOR(RGB,205/255,205/255,205/255),style=patchcontour,g
```

```
  rid=[20,20,20],light=[90,-5,1,1,1],tickmarks=[3,3,3],orientation
  =[52,63],scaling=constrained):
> AsSmer:= plottools[arrow](vector([0, 0, 1]), 2.3*u, .1, .2, .1,
  cylindrical_arrow):
> plots[display](Valec,AsSmer,
  view=[-1.5..1.5,-1.5..1.5,0..3.5],color=red, orientation=[52,
  63]);
```