

Tirangular mesh

PMesh

feval (f# , x# , y#) := | str2num (concat (num2str (f#) , " (" , num2str (x#) , " , " , num2str (y#) , ") "))

pRange (a , b , n) := | eval (a + (b - a) / n . [0 .. n])

pTMesh (F) := | T := eval (stack (F , row (F , rows (F))))
| T := eval (augment (F , col (F , cols (F))))
| [nu := rows (T) - 1 nv := cols (T) - 1]
| [np := 5 r_np := [1 .. np] r_nv := [1 .. (nv - 1)]]
| [M := eval (matrix (0 , 3)) c := [1 .. 3]]
| for u ∈ [1 .. nu]
| | for v ∈ [1 .. nv]
| | | [r := rows (M) k := r + r_np]
| | | M_k_c := T [0 0 1 0 1]_k-r + u [0 1 1 0 0]_k-r + v_c
| | | [r := rows (M) k := r + r_nv]
| | | M_k_c := M (u - 1) . (np . nv + nv - 1) + np . (v - 1) - (k - r - 1) . np c
| eval (M)

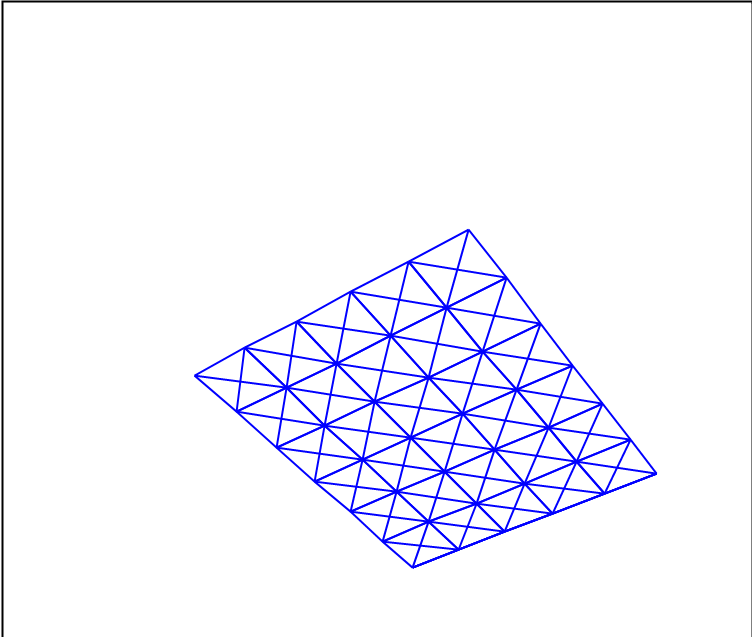
PMesh returns a matrix suitable for 3D plots.

pTMesh (F , X , Y) := | [r := [1 .. length (X)] c := [1 .. length (Y)] M := 0]
| eval (pTMesh (M_r_c := feval (F , X_r , Y_c)))

gamma := [-0.8232 -0.4194 0.3827
0.5677 -0.6187 0.543
0.009 0.6643 0.7474]

TriMesh

"The Mesh"
F (u , v) := [u
v
0]
U := pRange (0 , 20 , 5)
V := pRange (0 , 25 , 6)
S := pTMesh (F , U , V)



S . gamma . 1 + 5

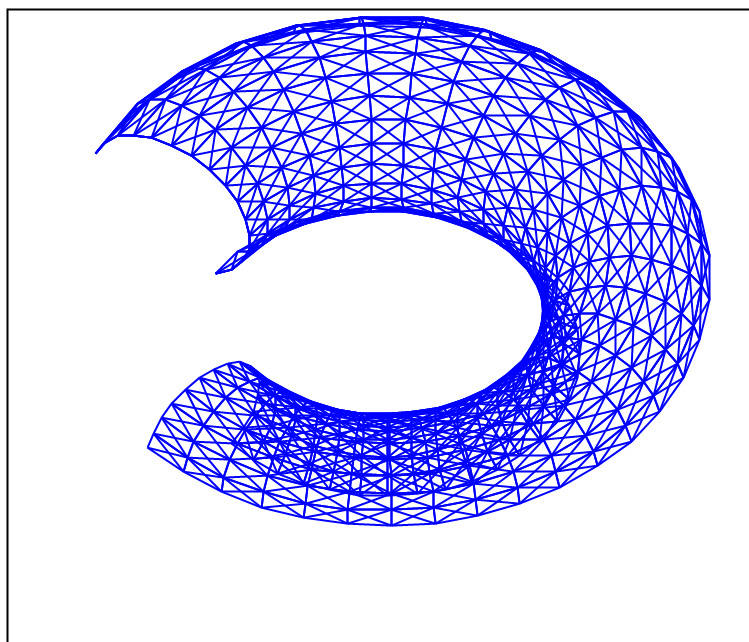
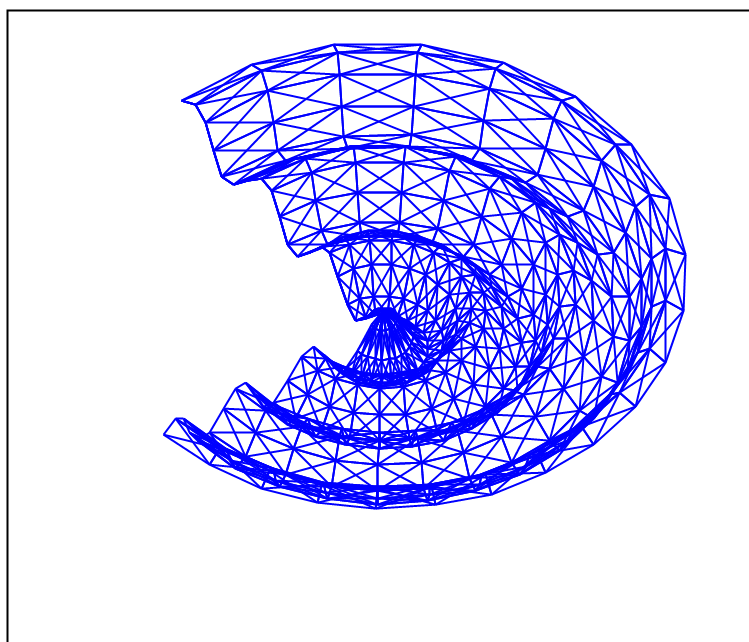
"Torus" $[R := 6 \ r := 2]$

$$\text{Torus}(u, v) := \begin{bmatrix} (R + r \cdot \cos(u)) \cdot \cos(v) \\ (R + r \cdot \cos(u)) \cdot \sin(v) \\ r \cdot \sin(u) \end{bmatrix}$$

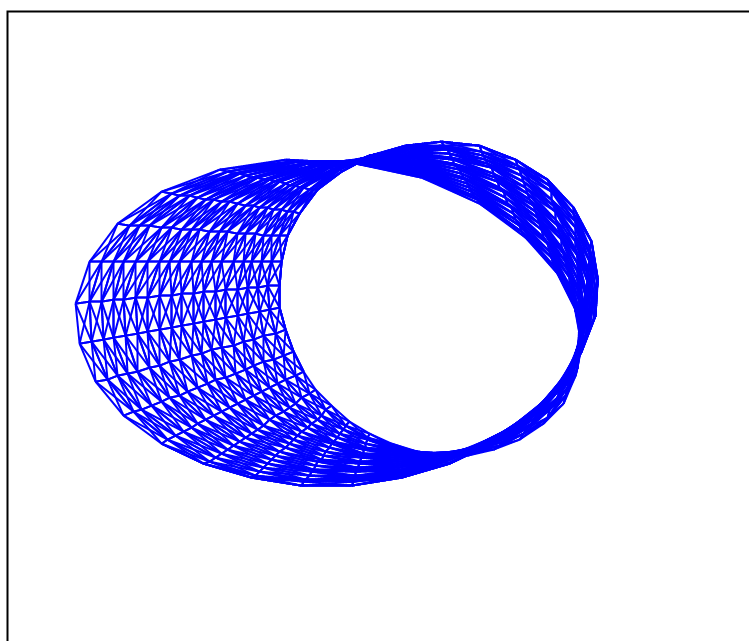
 $U := \text{pRange}(0, 4, 15)$ $V := \text{pRange}(0, 5, 30)$ $S := \text{pTMesh}(\text{Torus}, U, V)$

How to apply another
coordinate system:

$$\text{cyl2xyz}(P) := \begin{bmatrix} P_1 \cdot \cos\left(\frac{P_2}{2}\right) \\ P_1 \cdot \sin\left(\frac{P_2}{2}\right) \\ P_3 \end{bmatrix} \quad P = \begin{bmatrix} \rho \\ \varphi \\ z \end{bmatrix}$$

 $S \cdot \gamma \cdot 2$ **"Some wave"** $f(r) := 0.5 \cdot \cos(4 \cdot r)$ $F(r, \theta) := \text{cyl2xyz}([r \ \theta \ f(r)])$ $U := \text{pRange}(0, 5, 20)$ $V := \text{pRange}(0, 1.5 \cdot \pi, 20)$ $S := \text{pTMesh}(F, U, V)$  $S \cdot \gamma \cdot 3$ **"Mobius"**

$$F(t, s) := \begin{bmatrix} \left(r + s \cdot \cos\left(\frac{t}{2}\right)\right) \cdot \cos(t) \\ \left(r + s \cdot \cos\left(\frac{t}{2}\right)\right) \cdot \sin(t) \\ s \cdot \sin\left(\frac{t}{2}\right) \end{bmatrix}$$

 $U := \text{pRange}(0, 2 \cdot \pi, 30)$ $V := \text{pRange}(-1, 1, 18)$ $S := \text{pTMesh}(F, U, V)$  $S \cdot \gamma \cdot 5$