

```
> # FUKURAMI kyokumen PG001 2020年12月14日コメント挿入 by H.E 文献  
DOVAL第5論文：幾何数学とともに 愛と情熱内にもある：
```

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

```
> m:=1:# 任意定数条件 k>m>n>0:
```

```
> ao:=180:# 外補助円半径:
```

```
> ai:=80:# 内補助円半径:
```

```
> oo:=70:# 補助円中心間距離:
```

```
#
```

(1)

```
> n:=(ao-ai)*m/(ao+ai);
```

$$n := \frac{5}{13}$$

(2)

```
> k:=(ao-ai)/oo;
```

$$k := \frac{10}{7}$$

(3)

```
> c:=2*oo*ao*ai/(ao*ao-ai*ai);
```

$$c := \frac{1008}{13}$$

(4)

```
> #ao:=k*c/(m-n);
```

```
> #ai:=k*c/(m+n);
```

```
> #oo:=2*m*n*c/(m^2-n^2);
```

```
> #er:=oo/(ao-ai);
```

```
> #el:=oo/(ao+ai);
```

```
> 擬似トーラス
```

```
> r1c:=(k*m-n^2*cos(s))*c/(m^2-n^2):
```

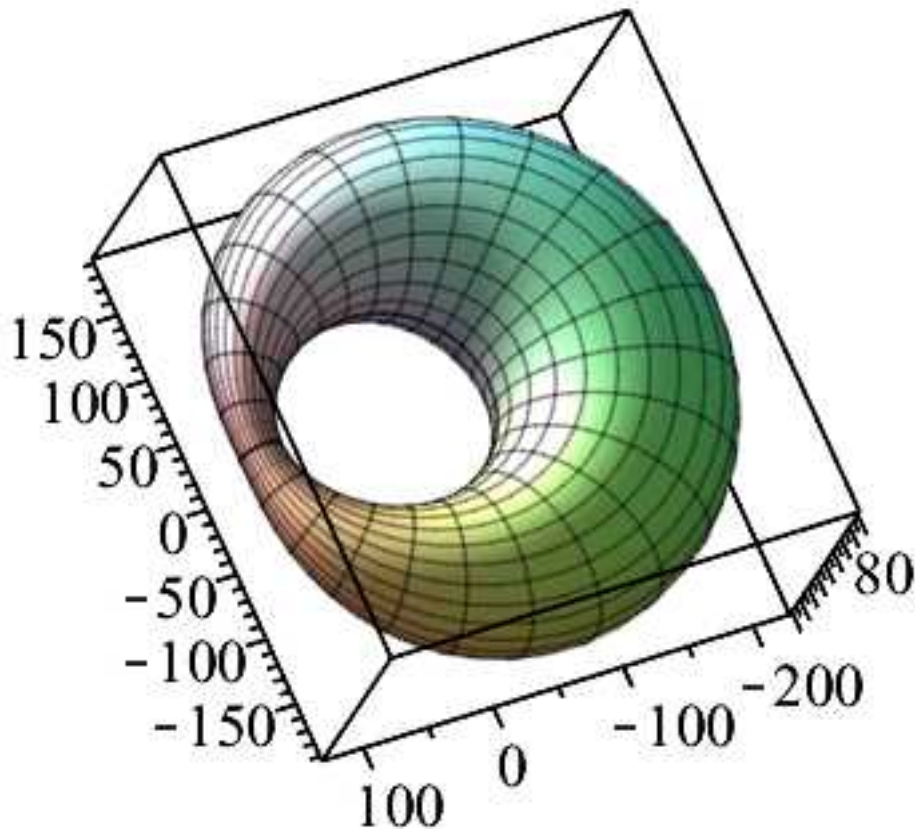
```
> r1r:=sqrt(r1c^2-(k^2-n^2)*(c^2)/(m^2-n^2)):
```

```
> xt:=r1c*cos(s)-r1r*cos(t)*cos(s):
```

```
> yt:=r1r*sin(t):
```

```
> zt:=r1c*sin(s)-r1r*cos(t)*sin(s):
```

```
> plot3d([xt,yt,zt],t=0..2*Pi,s=0..2*Pi,scaling=constrained);
```



> 自己交差曲面 部分図

```
> ct:=plot3d([- (xt-(k^2-n^2)*c/(m^2-n^2)), yt, zt], t=0..2*Pi, s=0..1.5*Pi):
```

```
> r2c:=(k*n-m^2*cos(s))*c/(m^2-n^2):
```

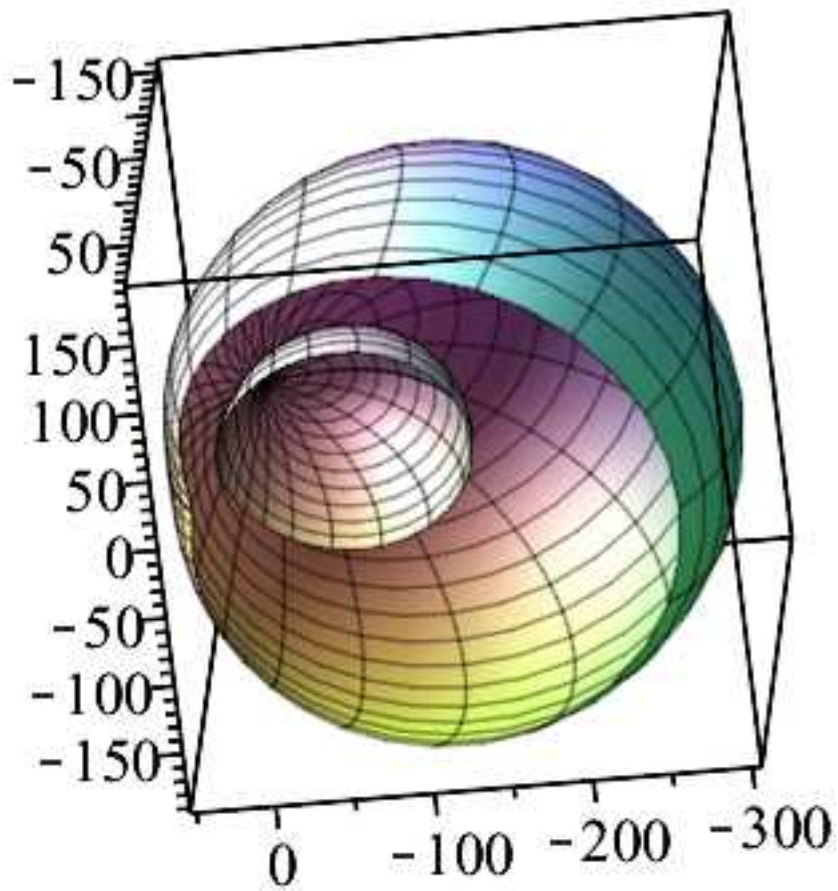
```
> r2r:=sqrt(r2c^2-(m^2-k^2)*(c^2)/(m^2-n^2)):
```

```
> xs:=r2c*cos(s)-r2r*cos(t)*cos(s):
```

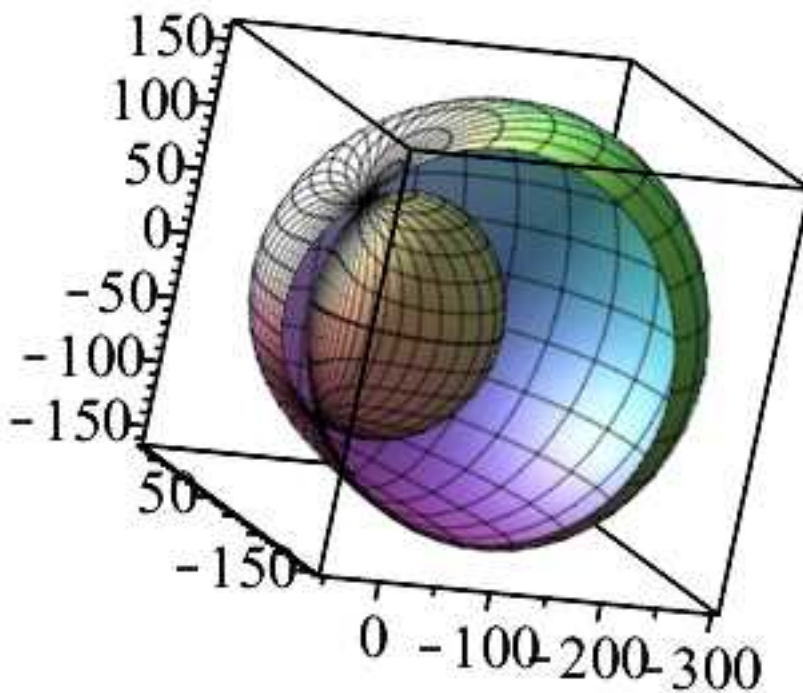
```
> ys:=r2r*sin(t):
```

```
> zs:=r2c*sin(s)-r2r*cos(t)*sin(s):
```

```
> plot3d([xs, ys, zs], t=0.8*Pi..2*Pi, s=0..2*Pi);
```



> plot3d([xs, ys, zs], t=0..2*Pi, s=0..1.2*Pi);



> cs:=plot3d([- (xs-(k^2-m^2)*c/(m^2-n^2)), ys, zs], t=0..1.2*Pi, s=0..1.2*

Pi):

> 二重閉曲面

> $c3 := (k^2 - n^2) * c / (m^2 - n^2) :$

> $r3c := (k^2 * \cos(s) - m * n) * c3 / (k^2 - n^2) :$

> $r3r := \sqrt{(r3c^2 - (k^2 - m^2) * (c3^2) / (k^2 - n^2))} :$

> $ss := \arccos((\sqrt{(k^2 - m^2) * (k^2 - n^2)} + m * n) / k^2) :$

> $xn := r3c * \cos(s) - r3r * \cos(t) * \cos(s) :$

> $yn := r3r * \sin(t) :$

> $zn := r3c * \sin(s) - r3r * \cos(t) * \sin(s) :$

> $cg_n := \text{plot3d}([xn, yn, zn], t=0..2*\text{Pi}, s=-ss+0.001..ss-0.001) :$

> $c3 := (k^2 - n^2) * c / (m^2 - n^2) :$

> $r3cg := (k^2 * \cos(s) + m * n) * c3 / (k^2 - n^2) :$

> $r3rg := \sqrt{(r3cg^2 - (k^2 - m^2) * (c3^2) / (k^2 - n^2))} :$

> $ssg := \text{evalf}(\arccos((\sqrt{(k^2 - m^2) * (k^2 - n^2)} - m * n) / k^2), 20) :$

> $xg := r3cg * \cos(s) - r3rg * \cos(t) * \cos(s) :$

> $yg := r3rg * \sin(t) :$

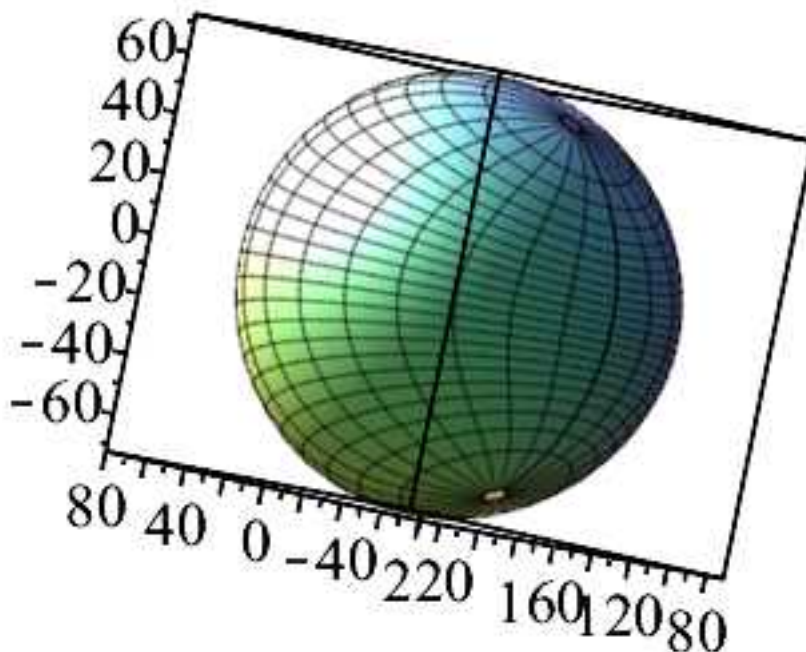
> $zg := r3cg * \sin(s) - r3rg * \cos(t) * \sin(s) :$

> $cg := \text{plot3d}([xg, yg, zg], t=0..2*\text{Pi}, s=-ssg+0.001..ssg-0.001) :$

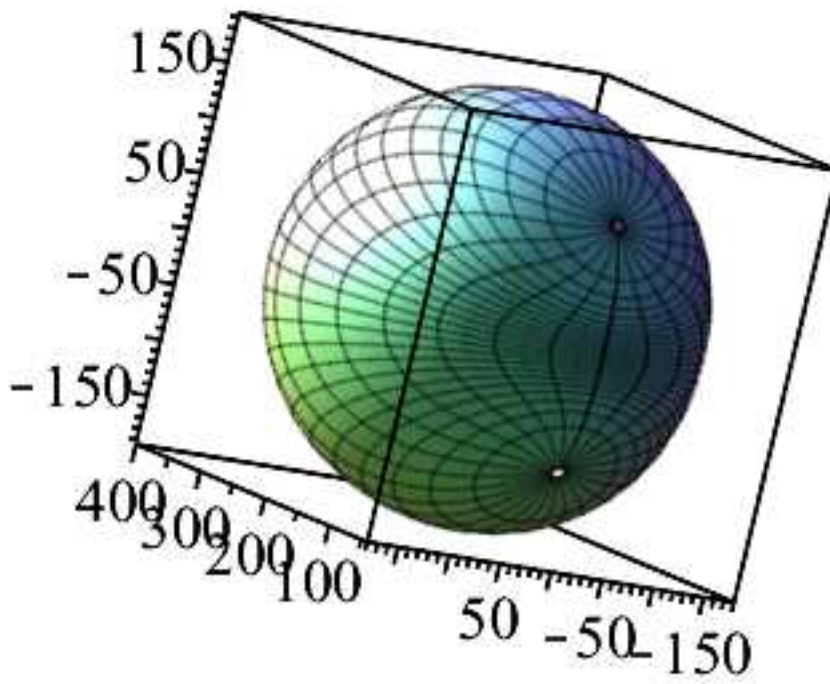
> $cgw1 := \text{plot3d}([xg, yg, zg], t=0.5*\text{Pi}..2*\text{Pi}, s=-ssg+0.0001..ssg-0.0001) :$

> $cgw2 := \text{plot3d}([xg, yg, zg], t=0.5*\text{Pi}..2*\text{Pi}, s=-ssg+0.001..0.7*ssg) :$

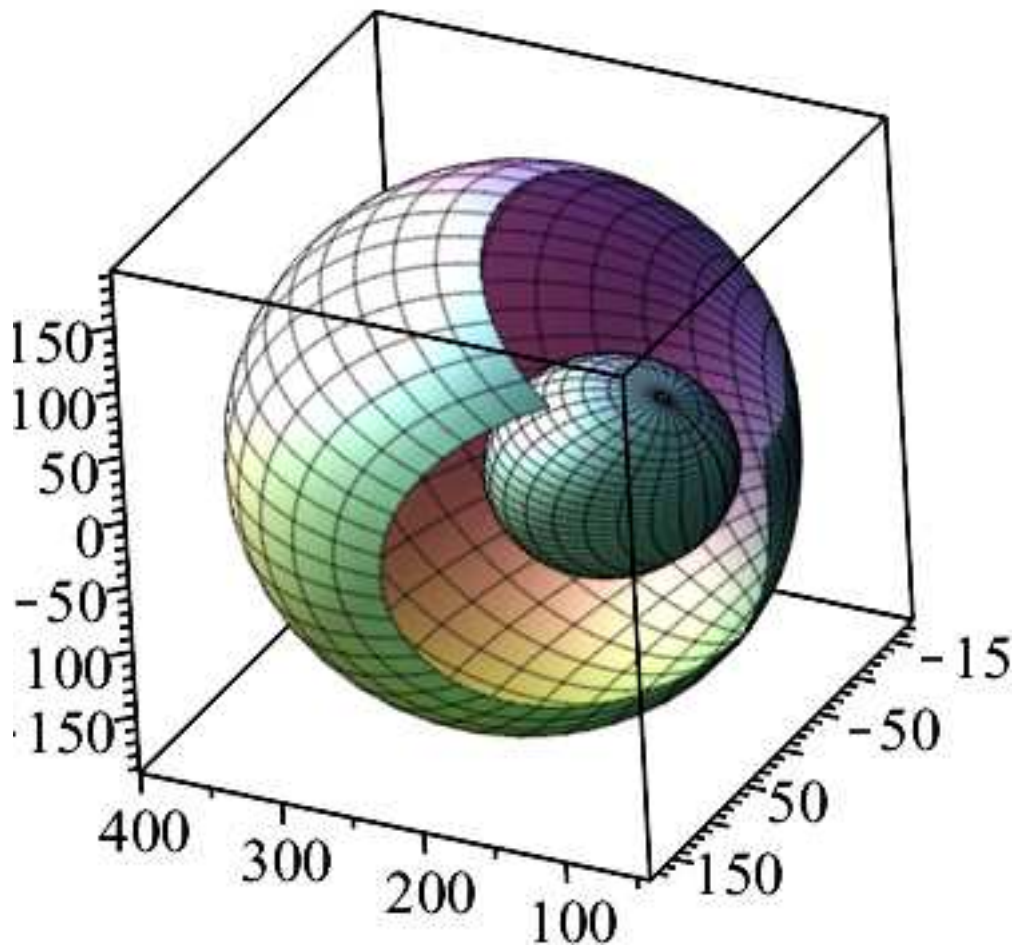
> $\text{plots}[\text{display3d}](\{cg_n\}) :$



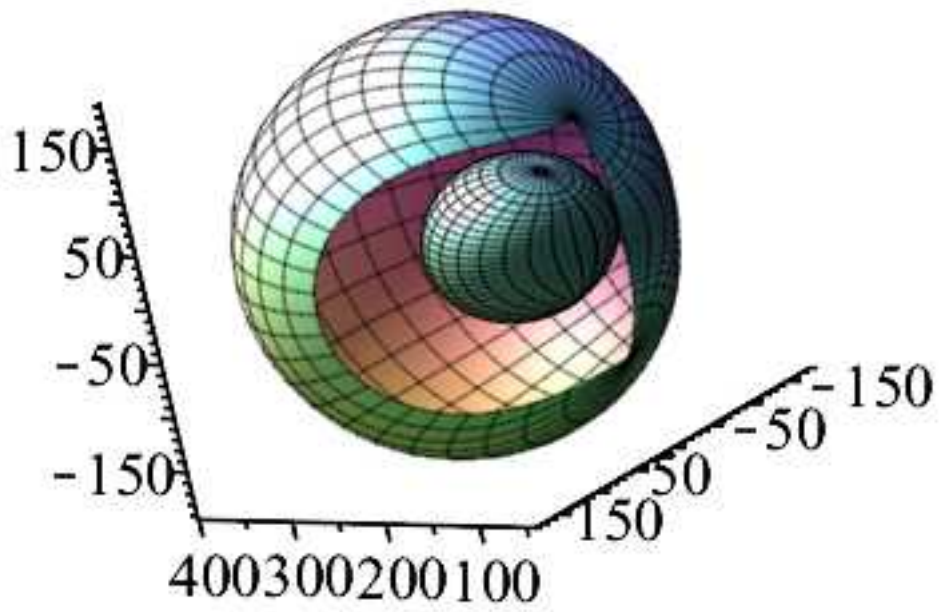
> $\text{plots}[\text{display3d}](\{cg\}) :$



> plots[display3d]({cgn, cgw2}); II window



> plots[display3d]({cgn, cgw1});# I window



> plots[display3d]({cs, ct, cgn, cgw2});# 3 (4) 局面はめ込み

