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In[148]:= (*File for the video of the torus for 5x5 matrices
with the r paramter scaled and R=0.9. This file generated the
stills for the paper. Chop was used to help simplify and plot.
increase step to make the video, and complss in linux using
ffmpeg-i C5scale.avi-vcodec msmpeg4v2-q:v 6 C5scale_cmprsd.avi.avi
*)
n = 5;
Iden = IdentityMatrix[n];
w = E^(2*Pi*I/n);
R = 0.9; (*change to 8/10,
4/10 to run symbolically (numeric was much faster for me)*)
(*r=(0.6);*)
(u = {{0, 0, 0, 0, 1}, {1, 0, 0, 0, 0},
      {0, 1, 0, 0, 0}, {0, 0, 1, 0, 0}, {0, 0, 0, 1, 0}} // MatrixForm;
(v = {{w, 0, 0, 0, 0}, {0, (w)^2, 0, 0, 0}, {0, 0, (w)^3, 0, 0},
      {0, 0, 0, (w)^4, 0}, {0, 0, 0, 0, (w)^5}} // MatrixForm;
(a = ((1/2) * (R * Iden + (r/2) * ConjugateTranspose[u] + (r/2) * u)).
      ConjugateTranspose[v] +
      (1/2) * v. (R * Iden + (r/2) * ConjugateTranspose[u] + (r/2) * u) // MatrixForm
(b = ((1/2) * I * (R * Iden + (r/2) * ConjugateTranspose[u] + (r/2) * u)).
      ConjugateTranspose[v] -
      (1/2) * I * v. (R * Iden + (r/2) * ConjugateTranspose[u] + (r/2) * u) // MatrixForm
(c = (r * I/2) * ConjugateTranspose[u] - u * (r * I/2)) // MatrixForm
sigma1 = {{0, 1}, {1, 0}};
sigma2 = {{0, -I}, {I, 0}};
sigma3 = {{1, 0}, {0, -1}};
loclzr = KroneckerProduct[sigma1, a - x * Iden] +
          KroneckerProduct[sigma2, b - y * Iden] +
          KroneckerProduct[sigma3, c - z * Iden];
MatrixForm[loclzr]
charpoly = Simplify[Det[loclzr]]
charpoly = Chop[charpoly]

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Out[154]/MatrixForm=

$$\begin{pmatrix}
0.278115 + 0. i & 0. + \frac{1}{2} \left(0. + e^{\frac{2i\pi}{5}} \left(0. + \frac{r}{2} \right) \right) + \frac{1}{2} e^{-\frac{4i\pi}{5}} \left(0. + \frac{r}{2} \right) & & & \\
0. + \frac{1}{2} \left(0. + e^{\frac{4i\pi}{5}} \left(0. + \frac{r}{2} \right) \right) + \frac{1}{2} e^{-\frac{2i\pi}{5}} \left(0. + \frac{r}{2} \right) & & -0.728115 + 0. i & & 0. + \\
0. & & 0. + \frac{1}{2} \left(0. + e^{-\frac{4i\pi}{5}} \left(0. + \frac{r}{2} \right) \right) + \frac{1}{2} e^{-\frac{4i\pi}{5}} \left(0. + \frac{r}{2} \right) & & \\
0. & & 0. & & 0. + \\
0. + \frac{1}{2} \left(0. + \frac{r}{2} \right) + \frac{1}{2} e^{-\frac{2i\pi}{5}} \left(0. + \frac{r}{2} \right) & & 0. & &
\end{pmatrix}$$

Out[155]/MatrixForm=

$$\begin{pmatrix} 0.855951 + 0. i & (0. + 0. i) - \frac{1}{2} i \left(0. + e^{\frac{2i\pi}{5}} \left(0. + \frac{r}{2} \right) \right) + \\ (0. + 0. i) - \frac{1}{2} i \left(0. + e^{\frac{4i\pi}{5}} \left(0. + \frac{r}{2} \right) \right) + \frac{1}{2} i e^{-\frac{2i\pi}{5}} \left(0. + \frac{r}{2} \right) & 0.529007 + 0. i \\ 0. + 0. i & (0. + 0. i) - \frac{1}{2} i \left(0. + e^{-\frac{4i\pi}{5}} \left(0. + \frac{r}{2} \right) \right) + \\ 0. + 0. i & 0. + 0. i \\ (0. + 0. i) - \frac{1}{2} i \left(0. + \frac{r}{2} \right) + \frac{1}{2} i e^{-\frac{2i\pi}{5}} \left(0. + \frac{r}{2} \right) & 0. + 0. i \end{pmatrix}$$

Out[156]/MatrixForm=

$$\begin{pmatrix} 0 & \frac{i r}{2} & 0 & 0 & -\frac{i r}{2} \\ -\frac{i r}{2} & 0 & \frac{i r}{2} & 0 & 0 \\ 0 & -\frac{i r}{2} & 0 & \frac{i r}{2} & 0 \\ 0 & 0 & -\frac{i r}{2} & 0 & \frac{i r}{2} \\ \frac{i r}{2} & 0 & 0 & -\frac{i r}{2} & 0 \end{pmatrix}$$

Out[161]/MatrixForm=

$$\begin{pmatrix} -z \\ -\frac{i r}{2} \\ 0. + 0. i \\ 0. + 0. i \\ \frac{i r}{2} \\ (0.278115 + 0. i) - x + i \left((0.855951 + 0. i) - y \right) \\ 0. + i \left((0. + 0. i) - \frac{1}{2} i \left(0. + e^{\frac{4i\pi}{5}} \left(0. + \frac{r}{2} \right) \right) + \frac{1}{2} i e^{-\frac{2i\pi}{5}} \left(0. + \frac{r}{2} \right) \right) + \frac{1}{2} \left(0. + e^{\frac{4i\pi}{5}} \left(0. + \frac{r}{2} \right) \right) + \frac{1}{2} e^{-\frac{2i\pi}{5}} \\ 0. + 0. i \\ 0. + 0. i \\ 0. + i \left((0. + 0. i) - \frac{1}{2} i \left(0. + \frac{r}{2} \right) + \frac{1}{2} i e^{-\frac{2i\pi}{5}} \left(0. + \frac{r}{2} \right) \right) + \frac{1}{2} \left(0. + \frac{r}{2} \right) + \frac{1}{2} e^{-\frac{2i\pi}{5}} \left(0. + \frac{r}{2} \right) \end{pmatrix}$$

Out[162]=

$$\begin{aligned} & (-0.348678 - 9.15053 \times 10^{-17} i) - (0.0234375 + 2.60209 \times 10^{-18} i) r^{10} + \\ & (9.44966 \times 10^{-16} + 3.93376 \times 10^{-16} i) x^9 - (1. + 1.11022 \times 10^{-16} i) x^{10} + \\ & (3.18268 \times 10^{-17} - 2.61323 \times 10^{-16} i) y + (2.46817 \times 10^{-16} - 1.38564 \times 10^{-16} i) y^2 - \\ & (4.93635 \times 10^{-16} - 2.77127 \times 10^{-16} i) y^3 - (1.39247 \times 10^{-15} - 7.4428 \times 10^{-16} i) y^4 - \\ & (9.31895 \times 10^{-16} - 1.35341 \times 10^{-15} i) y^5 - (4.35629 \times 10^{-16} - 1.19217 \times 10^{-15} i) y^6 + \\ & (7.73342 \times 10^{-16} + 1.03282 \times 10^{-15} i) y^7 + (1.05322 \times 10^{-15} + 7.99545 \times 10^{-18} i) y^8 + \\ & (6.65174 \times 10^{-16} + 2.50815 \times 10^{-16} i) y^9 - (1. + 1.11022 \times 10^{-16} i) y^{10} + \\ & r^9 \left((-0.060054 - 9.96698 \times 10^{-18} i) - (5.36059 \times 10^{-19} + 1.64982 \times 10^{-18} i) x + \right. \\ & \quad \left. (1.19705 \times 10^{-18} - 1.31569 \times 10^{-17} i) y + (0.185753 + 7.42419 \times 10^{-18} i) z \right) - \\ & (2.15234 + 6.61311 \times 10^{-16} i) z^2 + (9.10997 \times 10^{-17} - 4.38175 \times 10^{-16} i) y z^2 - \\ & (2.6572 + 8.22951 \times 10^{-16} i) y^2 z^2 - (3.48408 \times 10^{-16} + 3.53738 \times 10^{-16} i) y^3 z^2 - \end{aligned}$$

$$\begin{aligned}
& (3.2805 - 2.69322 \times 10^{-16} \, i) y^4 z^2 - (1.60781 \times 10^{-15} - 3.67428 \times 10^{-15} \, i) y^5 z^2 - \\
& (4.05 - 6.06245 \times 10^{-16} \, i) y^6 z^2 + (1.74737 \times 10^{-15} + 1.06655 \times 10^{-15} \, i) y^7 z^2 - \\
& (5. + 3.43935 \times 10^{-16} \, i) y^8 z^2 - (5.31441 + 1.22355 \times 10^{-15} \, i) z^4 + \\
& (1.54152 \times 10^{-15} + 4.33015 \times 10^{-16} \, i) y z^4 - (9.8415 + 1.93733 \times 10^{-15} \, i) y^2 z^4 - \\
& (7.07477 \times 10^{-16} - 6.96816 \times 10^{-16} \, i) y^3 z^4 - \\
& (12.15 + 1.77127 \times 10^{-15} \, i) y^4 z^4 + (2.07979 \times 10^{-15} + 3.52672 \times 10^{-15} \, i) y^5 z^4 - \\
& (10. + 6.87869 \times 10^{-16} \, i) y^6 z^4 - (6.561 + 1.15077 \times 10^{-15} \, i) z^6 + \\
& (6.28201 \times 10^{-16} + 4.963 \times 10^{-16} \, i) y z^6 - (12.15 + 3.03834 \times 10^{-15} \, i) y^2 z^6 + \\
& (2.23834 \times 10^{-15} + 1.14049 \times 10^{-15} \, i) y^3 z^6 - (10. + 6.87869 \times 10^{-16} \, i) y^4 z^6 - \\
& (4.05 - 1.83891 \times 10^{-16} \, i) z^8 + (2.79793 \times 10^{-16} + 1.42561 \times 10^{-16} \, i) y z^8 - \\
& (5. + 3.43935 \times 10^{-16} \, i) y^2 z^8 - (1. + 1.11022 \times 10^{-16} \, i) z^{10} + \\
& x^8 \left((-9.77626 \times 10^{-17} + 1.31586 \times 10^{-15} \, i) + (3.0877 \times 10^{-16} + 9.50296 \times 10^{-16} \, i) y - \right. \\
& \quad \left. (5. + 3.43935 \times 10^{-16} \, i) y^2 - (5. + 3.43935 \times 10^{-16} \, i) z^2 \right) + \\
& x^7 \left((4.91551 \times 10^{-16} + 1.15356 \times 10^{-15} \, i) - (1.50557 \times 10^{-16} - 1.33301 \times 10^{-15} \, i) y + \right. \\
& \quad \left. (1.94789 \times 10^{-15} + 2.40222 \times 10^{-15} \, i) y^2 + (4.22354 \times 10^{-16} - 1.37231 \times 10^{-16} \, i) y^3 + \right. \\
& \quad \left. (3.78786 \times 10^{-15} + 5.20286 \times 10^{-16} \, i) z^2 \right) + \\
& r^8 \left((0.320349 + 3.55659 \times 10^{-17} \, i) + (0.321721 + 2.25197 \times 10^{-17} \, i) x^2 + \right. \\
& \quad \left. (0.321721 + 1.01711 \times 10^{-16} \, i) y^2 + x \left((1.08878 \times 10^{-16} + 1.10543 \times 10^{-16} \, i) - \right. \right. \\
& \quad \quad \left. \left. (2.25614 \times 10^{-17} - 9.15465 \times 10^{-18} \, i) y - (1.20098 \times 10^{-16} + 7.77134 \times 10^{-17} \, i) z \right) + \right. \\
& \quad \left. y \left((3.06856 \times 10^{-17} + 4.62162 \times 10^{-18} \, i) + (6.35154 \times 10^{-17} + 1.58425 \times 10^{-17} \, i) z \right) - \right. \\
& \quad \left. (0.761125 + 1.9009 \times 10^{-16} \, i) z + (0.12071 + 6.61957 \times 10^{-17} \, i) z^2 \right) + \\
& x^6 \left((-5.41183 \times 10^{-16} + 7.5952 \times 10^{-16} \, i) + (2.11177 \times 10^{-16} - 6.86156 \times 10^{-17} \, i) y^3 - \right. \\
& \quad \left. (10. + 6.87869 \times 10^{-16} \, i) y^4 - (4.05 - 6.06245 \times 10^{-16} \, i) z^2 - (10. + 6.87869 \times 10^{-16} \, i) z^4 + \right. \\
& \quad \left. y^2 \left((-1.42028 \times 10^{-15} + 2.09578 \times 10^{-15} \, i) - (20. + 1.37574 \times 10^{-15} \, i) z^2 \right) + \right. \\
& \quad \left. y \left((5.24551 \times 10^{-18} + 4.65239 \times 10^{-16} \, i) - (5.0163 \times 10^{-16} - 1.33035 \times 10^{-15} \, i) z^2 \right) \right) + \\
& r^7 \left((1.09752 + 1.74643 \times 10^{-16} \, i) + (2.14424 \times 10^{-18} + 6.59928 \times 10^{-18} \, i) x^3 - \right. \\
& \quad \left. (2.63971 \times 10^{-17} - 8.57694 \times 10^{-18} \, i) y^3 + x^2 \left((-0.411617 - 7.20957 \times 10^{-17} \, i) + \right. \right. \\
& \quad \quad \left. \left. (2.0131 \times 10^{-17} - 5.03169 \times 10^{-17} \, i) y - (0.579429 + 3.28301 \times 10^{-16} \, i) z \right) + \right. \\
& \quad \left. y^2 \left((-0.411617 + 5.98899 \times 10^{-17} \, i) - (0.579429 + 6.43296 \times 10^{-17} \, i) z \right) + \right. \\
& \quad \left. (0.228602 + 3.85784 \times 10^{-17} \, i) z - (2.40965 + 1.61936 \times 10^{-16} \, i) z^2 + \right. \\
& \quad \left. (0.417427 + 1.99466 \times 10^{-17} \, i) z^3 + y \left((8.57694 \times 10^{-18} + 2.63971 \times 10^{-17} \, i) - \right. \right. \\
& \quad \quad \left. \left. (2.39197 \times 10^{-17} + 2.87079 \times 10^{-17} \, i) z + (1.56759 \times 10^{-17} - 4.15733 \times 10^{-17} \, i) z^2 \right) + \right. \\
& \quad \left. x \left((-2.17755 \times 10^{-17} - 2.21086 \times 10^{-17} \, i) + (7.30812 \times 10^{-17} + 5.65103 \times 10^{-17} \, i) y^2 + \right. \right. \\
& \quad \quad \left. \left. (1.09877 \times 10^{-16} - 2.11092 \times 10^{-17} \, i) z + (1.8478 \times 10^{-16} - 6.00386 \times 10^{-17} \, i) y z + \right. \right. \\
& \quad \quad \left. \left. (1.22742 \times 10^{-16} + 1.84865 \times 10^{-17} \, i) z^2 \right) \right) + \\
& x^5 \left((1.18098 + 4.47881 \times 10^{-16} \, i) - (5.45435 \times 10^{-16} - 4.78829 \times 10^{-15} \, i) y^3 + \right. \\
& \quad \left. (5.1735 \times 10^{-15} + 2.98846 \times 10^{-15} \, i) y^4 + \right. \\
& \quad \left. (3.35959 \times 10^{-15} + 2.80047 \times 10^{-16} \, i) z^2 + (5.26343 \times 10^{-15} + 3.9105 \times 10^{-16} \, i) z^4 + \right. \\
& \quad \left. y \left((1.21695 \times 10^{-15} + 8.71173 \times 10^{-16} \, i) + (2.54711 \times 10^{-15} + 2.09079 \times 10^{-15} \, i) z^2 \right) + \right. \\
& \quad \left. y^2 \left((-2.25966 \times 10^{-15} + 1.66809 \times 10^{-15} \, i) + (1.14295 \times 10^{-14} + 2.12311 \times 10^{-15} \, i) z^2 \right) \right) + \\
& x^4 \left((3.86714 \times 10^{-16} - 6.7283 \times 10^{-17} \, i) - (2.77905 \times 10^{-16} - 2.55406 \times 10^{-15} \, i) y^5 - \right. \\
& \quad \left. (10. + 6.87869 \times 10^{-16} \, i) y^6 - (3.2805 + 1.53032 \times 10^{-16} \, i) z^2 - \right. \\
& \quad \left. (12.15 - 3.40495 \times 10^{-16} \, i) z^4 - (10. + 6.87869 \times 10^{-16} \, i) z^6 + \right.
\end{aligned}$$

$$\begin{aligned}
& y^4 \left((-3.80119 \times 10^{-15} + 1.23508 \times 10^{-15} i) - (30. + 3.33067 \times 10^{-15} i) z^2 \right) + \\
& y^3 \left((-4.6772 \times 10^{-15} - 3.61666 \times 10^{-15} i) + (2.53878 \times 10^{-15} + 7.81355 \times 10^{-15} i) z^2 \right) + \\
& y^2 \left((3.90677 \times 10^{-15} - 1.26939 \times 10^{-15} i) - (12.15 - 2.87462 \times 10^{-15} i) z^2 - \right. \\
& \quad \left. (30. + 3.33067 \times 10^{-15} i) z^4 \right) + y \left((1.66293 \times 10^{-15} + 6.27038 \times 10^{-16} i) - \right. \\
& \quad \left. (9.71278 \times 10^{-16} + 1.55218 \times 10^{-15} i) z^2 + (1.87394 \times 10^{-15} + 2.89319 \times 10^{-15} i) z^4 \right) + \\
& x^3 \left((8.42043 \times 10^{-16} + 7.6611 \times 10^{-17} i) - (1.70008 \times 10^{-15} - 1.95322 \times 10^{-15} i) y^5 + \right. \\
& \quad \left. (2.5128 \times 10^{-15} + 1.9852 \times 10^{-15} i) y^6 - (4.22354 \times 10^{-16} - 1.37231 \times 10^{-16} i) y^7 + \right. \\
& \quad \left. (3.23685 \times 10^{-15} + 2.6156 \times 10^{-16} i) z^2 + \right. \\
& \quad \left. (5.22588 \times 10^{-15} - 4.43082 \times 10^{-16} i) z^4 + (4.1336 \times 10^{-15} + 1.2251 \times 10^{-15} i) z^6 + \right. \\
& y^3 \left((2.87108 \times 10^{-15} - 2.66056 \times 10^{-15} i) + (3.30421 \times 10^{-15} + 8.7322 \times 10^{-15} i) z^2 \right) + \\
& y^4 \left((-5.10184 \times 10^{-15} - 3.70956 \times 10^{-16} i) + (9.26213 \times 10^{-15} + 5.51226 \times 10^{-15} i) z^2 \right) + \\
& y \left((3.59117 \times 10^{-15} + 9.92769 \times 10^{-16} i) + (5.21614 \times 10^{-15} - 2.62871 \times 10^{-15} i) z^2 + \right. \\
& \quad \left. (3.35751 \times 10^{-15} + 1.71074 \times 10^{-15} i) z^4 \right) + y^2 \left((-11.8098 - 8.88797 \times 10^{-16} i) + \right. \\
& \quad \left. (5.35337 \times 10^{-15} - 2.20636 \times 10^{-15} i) z^2 + (1.19098 \times 10^{-14} + 3.60135 \times 10^{-15} i) z^4 \right) + \\
& x^2 \left((-9.10997 \times 10^{-17} + 4.38175 \times 10^{-16} i) + (6.2287 \times 10^{-16} + 1.19845 \times 10^{-15} i) y^7 - \right. \\
& \quad \left. (5. + 3.43935 \times 10^{-16} i) y^8 - (2.65721 - 3.38522 \times 10^{-16} i) z^2 - \right. \\
& \quad \left. (9.8415 + 6.70272 \times 10^{-16} i) z^4 - (12.15 + 5.04213 \times 10^{-16} i) z^6 - (5. + 3.43935 \times 10^{-16} i) \right. \\
& \quad \left. z^8 + y^6 \left((1.78967 \times 10^{-15} + 1.18914 \times 10^{-16} i) - (20. + 1.37574 \times 10^{-15} i) z^2 \right) + \right. \\
& y^5 \left((-1.03456 \times 10^{-15} - 2.46551 \times 10^{-15} i) + (4.79844 \times 10^{-15} + 6.14545 \times 10^{-15} i) z^2 \right) + \\
& y^4 \left((5.07028 \times 10^{-16} - 2.9664 \times 10^{-15} i) - (12.15 - 1.60756 \times 10^{-15} i) z^2 - \right. \\
& \quad \left. (30. + 3.33067 \times 10^{-15} i) z^4 \right) + y^3 \left((9.39975 \times 10^{-16} - 3.57402 \times 10^{-15} i) - \right. \\
& \quad \left. (7.44382 \times 10^{-15} - 8.39281 \times 10^{-17} i) z^2 + (2.74462 \times 10^{-15} + 8.44708 \times 10^{-15} i) z^4 \right) + \\
& y^2 \left((3.47376 \times 10^{-15} + 2.72136 \times 10^{-16} i) - (6.561 + 1.57313 \times 10^{-15} i) z^2 - \right. \\
& \quad \left. (24.3 + 1.00843 \times 10^{-15} i) z^4 - (20. + 1.37574 \times 10^{-15} i) z^6 \right) + \\
& y \left((1.46891 \times 10^{-15} + 7.48447 \times 10^{-16} i) + (1.09819 \times 10^{-15} - 1.29071 \times 10^{-15} i) z^2 + \right. \\
& \quad \left. (2.23834 \times 10^{-15} + 1.14049 \times 10^{-15} i) z^4 - (2.13212 \times 10^{-17} - 2.80859 \times 10^{-15} i) z^6 \right) + \\
& x \left((1.70257 \times 10^{-16} + 3.04796 \times 10^{-18} i) - (1.14049 \times 10^{-15} - 2.23834 \times 10^{-15} i) y^7 + \right. \\
& \quad \left. (5.64915 \times 10^{-16} - 4.17024 \times 10^{-16} i) y^8 + \right. \\
& \quad \left. (6.75083 \times 10^{-16} + 1.01676 \times 10^{-16} i) z^2 + (2.77961 \times 10^{-15} - 7.86414 \times 10^{-16} i) z^4 + \right. \\
& \quad \left. (1.23275 \times 10^{-15} - 5.17282 \times 10^{-16} i) z^6 + (8.84927 \times 10^{-16} + 2.08597 \times 10^{-16} i) z^8 + \right. \\
& y^5 \left((-2.26481 \times 10^{-15} + 1.65226 \times 10^{-15} i) - (2.77467 \times 10^{-16} - 4.17591 \times 10^{-15} i) z^2 \right) + \\
& y^6 \left((-4.45071 \times 10^{-15} + 3.54737 \times 10^{-15} i) + (2.77869 \times 10^{-15} + 2.80351 \times 10^{-15} i) z^2 \right) + \\
& y^3 \left((-1.71539 \times 10^{-16} - 5.27942 \times 10^{-16} i) - (2.90317 \times 10^{-15} + 6.06085 \times 10^{-15} i) z^2 + \right. \\
& \quad \left. (1.54152 \times 10^{-15} + 4.33015 \times 10^{-16} i) z^4 \right) + y^4 \left((5.9049 + 6.55576 \times 10^{-16} i) - \right. \\
& \quad \left. (3.85914 \times 10^{-15} + 3.8039 \times 10^{-16} i) z^2 + (3.84848 \times 10^{-15} + 1.78468 \times 10^{-15} i) z^4 \right) + \\
& y \left((-9.24323 \times 10^{-18} + 6.13712 \times 10^{-17} i) + (2.04684 \times 10^{-16} - 1.5257 \times 10^{-15} i) z^2 + \right. \\
& \quad \left. (1.21977 \times 10^{-15} - 3.43146 \times 10^{-15} i) z^4 + (1.41495 \times 10^{-15} - 1.39363 \times 10^{-15} i) z^6 \right) + \\
& y^2 \left((3.11435 \times 10^{-16} + 5.99223 \times 10^{-16} i) + (6.15214 \times 10^{-16} - 2.41787 \times 10^{-15} i) z^2 + \right. \\
& \quad \left. (3.40015 \times 10^{-15} - 3.90643 \times 10^{-15} i) z^4 + (3.50007 \times 10^{-15} + 1.43094 \times 10^{-15} i) z^6 \right) + \\
& r^6 \left((0.7187 + 1.32586 \times 10^{-16} i) - (0.535477 + 2.4423 \times 10^{-16} i) x^4 - \right. \\
& \quad \left. (0.535477 - 4.61386 \times 10^{-17} i) y^4 + x^3 \left((3.66895 \times 10^{-16} + 2.30996 \times 10^{-16} i) - \right. \right. \\
& \quad \left. \left. (1.22742 \times 10^{-16} + 1.84865 \times 10^{-17} i) y - (8.49578 \times 10^{-17} + 8.18353 \times 10^{-17} i) z \right) + \right. \\
& \quad \left. y^3 \left((-2.03933 \times 10^{-16} + 2.70549 \times 10^{-16} i) - (1.25323 \times 10^{-17} + 8.34798 \times 10^{-17} i) z \right) + \right.
\end{aligned}$$

$$\begin{aligned}
& (0.343105 + 1.16952 \times 10^{-17} i) z + (2.6187 + 6.075 \times 10^{-16} i) z^2 + \\
& (0.369655 - 3.81514 \times 10^{-17} i) z^3 + \\
& (0.390625 + 9.61623 \times 10^{-17} i) z^4 + y^2 \left((2.83708 + 3.14979 \times 10^{-16} i) - \right. \\
& \quad \left. (3.12255 + 3.46673 \times 10^{-16} i) z + (1.13333 + 3.89796 \times 10^{-16} i) z^2 \right) + \\
& x^2 \left((2.83708 + 5.26156 \times 10^{-16} i) - (1.07095 - 1.45071 \times 10^{-16} i) y^2 + \right. \\
& \quad y \left((-1.76869 \times 10^{-16} + 1.74204 \times 10^{-16} i) - (2.30996 \times 10^{-16} - 3.66895 \times 10^{-16} i) z \right) - \\
& \quad \left. (3.12255 + 5.5785 \times 10^{-16} i) z + (1.13333 + 1.25825 \times 10^{-16} i) z^2 \right) + \\
& y \left((-7.12807 \times 10^{-17} + 1.39896 \times 10^{-16} i) + (2.08512 \times 10^{-16} + 2.82458 \times 10^{-16} i) z + \right. \\
& \quad \left. (1.12833 \times 10^{-16} + 1.67626 \times 10^{-16} i) z^2 + (4.95476 \times 10^{-18} - 7.45697 \times 10^{-17} i) z^3 \right) + \\
& x \left((-3.13289 \times 10^{-16} - 6.6014 \times 10^{-17} i) + (1.9819 \times 10^{-17} - 2.98279 \times 10^{-16} i) y^3 + \right. \\
& \quad y^2 \left((4.59618 \times 10^{-16} + 1.57093 \times 10^{-16} i) - (2.28331 \times 10^{-16} - 1.58213 \times 10^{-17} i) z \right) + \\
& \quad \left. (4.22354 \times 10^{-16} - 1.37231 \times 10^{-16} i) z - (2.7107 \times 10^{-16} - 1.5374 \times 10^{-16} i) z^2 + \right. \\
& \quad \left. (1.54761 \times 10^{-16} - 1.52429 \times 10^{-16} i) z^3 + \right. \\
& \quad \left. y \left((3.51406 \times 10^{-17} - 4.1219 \times 10^{-18} i) - (1.83823 \times 10^{-16} - 5.12079 \times 10^{-16} i) z - \right. \right. \\
& \quad \left. \left. (2.62639 \times 10^{-16} + 8.97672 \times 10^{-17} i) z^2 \right) \right) + \\
& r^5 \left((-0.00332778 + 3.32456 \times 10^{-17} i) + (0.125 + 6.79227 \times 10^{-19} i) x^5 - \right. \\
& \quad \left. (2.14424 \times 10^{-18} + 6.59928 \times 10^{-18} i) y^5 + \right. \\
& \quad y^4 \left((-0.5625 + 4.31384 \times 10^{-17} i) - (1.14546 + 1.27171 \times 10^{-16} i) z \right) + \\
& \quad x^4 \left((-0.5625 - 1.41641 \times 10^{-16} i) - (3.95957 \times 10^{-17} - 1.28654 \times 10^{-17} i) y - \right. \\
& \quad \left. (1.14546 + 1.27171 \times 10^{-16} i) z \right) - (4.13009 + 6.69709 \times 10^{-16} i) z + \\
& \quad (0.596421 - 2.76947 \times 10^{-16} i) z^2 + (6.42963 + 7.13832 \times 10^{-16} i) z^3 - \\
& \quad (1.58007 + 3.33806 \times 10^{-16} i) z^4 - (0.59441 + 3.95957 \times 10^{-17} i) z^5 + \\
& \quad x^3 \left((3.35397 \times 10^{-16} + 4.42385 \times 10^{-17} i) - (1.25 + 2.44366 \times 10^{-16} i) y^2 + \right. \\
& \quad y \left((2.20566 \times 10^{-16} + 1.39917 \times 10^{-16} i) + (1.37919 \times 10^{-16} + 4.27393 \times 10^{-17} i) z \right) - \\
& \quad \left. (9.30138 \times 10^{-17} + 4.65905 \times 10^{-16} i) z - (2.5044 \times 10^{-16} - 3.75968 \times 10^{-17} i) z^2 \right) + \\
& \quad y^3 \left((1.05588 \times 10^{-16} - 3.43078 \times 10^{-17} i) + (8.7102 \times 10^{-17} + 8.84346 \times 10^{-17} i) z - \right. \\
& \quad \left. (2.63971 \times 10^{-17} - 8.57694 \times 10^{-18} i) z^2 \right) + \\
& \quad y^2 \left((0.368608 - 9.10619 \times 10^{-17} i) + (4.28471 + 6.86876 \times 10^{-16} i) z + \right. \\
& \quad \left. (1.6875 + 5.04116 \times 10^{-16} i) z^2 + (0.270406 + 4.32197 \times 10^{-17} i) z^3 \right) + \\
& \quad y \left((8.57694 \times 10^{-18} + 2.63971 \times 10^{-17} i) - (6.57263 \times 10^{-16} + 1.3665 \times 10^{-16} i) z + \right. \\
& \quad \left. (1.86779 \times 10^{-16} - 3.23344 \times 10^{-16} i) z^2 + (3.62315 \times 10^{-16} - 3.22011 \times 10^{-16} i) z^3 + \right. \\
& \quad \left. (1.35608 \times 10^{-16} + 5.80821 \times 10^{-17} i) z^4 \right) + \\
& \quad x^2 \left((0.368608 + 1.46512 \times 10^{-16} i) + (1.35296 \times 10^{-16} - 1.8988 \times 10^{-16} i) y^3 + \right. \\
& \quad y^2 \left((-1.125 - 1.249 \times 10^{-16} i) - (2.29092 + 1.48755 \times 10^{-16} i) z \right) + \\
& \quad (4.28471 + 4.75699 \times 10^{-16} i) z + (1.6875 + 8.17617 \times 10^{-17} i) z^2 + \\
& \quad (0.270406 + 1.09212 \times 10^{-16} i) z^3 + y \left((3.33919 \times 10^{-16} - 5.01291 \times 10^{-17} i) + \right. \\
& \quad \left. (5.06791 \times 10^{-16} + 3.02277 \times 10^{-16} i) z - (8.51244 \times 10^{-17} + 5.98932 \times 10^{-17} i) z^2 \right) \right) + \\
& \quad x \left((9.4201 \times 10^{-17} + 2.04641 \times 10^{-17} i) + (0.625 + 9.57861 \times 10^{-17} i) y^4 + \right. \\
& \quad y^3 \left((1.04922 \times 10^{-16} + 5.34605 \times 10^{-17} i) + (6.46602 \times 10^{-17} + 1.54094 \times 10^{-16} i) z \right) + \\
& \quad (6.46178 \times 10^{-17} + 7.37787 \times 10^{-16} i) z - (3.86714 \times 10^{-16} - 6.7283 \times 10^{-17} i) z^2 - \\
& \quad (1.02923 \times 10^{-16} + 3.16765 \times 10^{-16} i) z^3 + (3.06856 \times 10^{-16} + 4.62162 \times 10^{-17} i) z^4 + \\
& \quad y^2 \left((-4.80248 \times 10^{-16} - 4.09495 \times 10^{-17} i) - (2.15132 \times 10^{-16} - 1.15328 \times 10^{-17} i) z + \right. \\
& \quad \left. (2.937 \times 10^{-16} - 5.33188 \times 10^{-16} i) z^2 \right) + y \left((-1.08899 \times 10^{-16} + 1.81303 \times 10^{-16} i) - \right.
\end{aligned}$$

$$\begin{aligned}
& \left((2.937 \times 10^{-16} - 5.33188 \times 10^{-16} i) z + (1.31562 \times 10^{-17} + 5.79404 \times 10^{-16} i) z^2 - \right. \\
& \left. (6.20375 \times 10^{-17} - 7.85251 \times 10^{-17} i) z^3 \right) + \\
r^4 & \left((-0.404841 - 2.03329 \times 10^{-16} i) - (2.38064 + 4.75481 \times 10^{-16} i) x^6 - \right. \\
& \left. (2.38064 - 5.24618 \times 10^{-17} i) y^6 + \right. \\
& y^5 \left((1.81448 \times 10^{-16} + 3.78803 \times 10^{-16} i) - (3.88046 \times 10^{-16} - 2.4282 \times 10^{-16} i) z \right) + \\
& x^5 \left((0.5625 + 4.05613 \times 10^{-16} i) + (2.11177 \times 10^{-16} - 6.86156 \times 10^{-17} i) y + \right. \\
& \left. (2.026 \times 10^{-16} - 9.50127 \times 10^{-17} i) z \right) - (2.91037 + 5.34292 \times 10^{-16} i) z - \\
& (4.03374 + 1.08137 \times 10^{-15} i) z^2 - (4.79072 + 9.54231 \times 10^{-16} i) z^3 - \\
& (4.92888 + 7.58393 \times 10^{-16} i) z^4 - (1.47862 - 4.70173 \times 10^{-17} i) z^5 - \\
& (0.698771 + 7.75792 \times 10^{-17} i) z^6 + y^4 \left((2.74744 + 5.16205 \times 10^{-16} i) - \right. \\
& \left. (3.36592 + 7.96046 \times 10^{-16} i) z - (1.22182 - 2.27332 \times 10^{-17} i) z^2 \right) + \\
& x^4 \left((2.74744 + 1.57209 \times 10^{-15} i) - (7.14191 + 1.63762 \times 10^{-15} i) y^2 + \right. \\
& \left. y \left((-5.08123 \times 10^{-16} - 1.2674 \times 10^{-16} i) - (1.79534 \times 10^{-16} - 5.25277 \times 10^{-16} i) z \right) - \right. \\
& \left. (3.36592 + 7.96046 \times 10^{-16} i) z - (1.22182 + 7.6918 \times 10^{-16} i) z^2 \right) + \\
& y^3 \left((-7.73427 \times 10^{-16} + 1.34566 \times 10^{-16} i) + (7.10142 \times 10^{-16} - 1.04789 \times 10^{-15} i) z + \right. \\
& \left. (3.32587 \times 10^{-16} + 1.25408 \times 10^{-16} i) z^2 + (4.56662 \times 10^{-16} - 3.16426 \times 10^{-17} i) z^3 \right) + \\
& y^2 \left((3.09396 + 5.54675 \times 10^{-16} i) - (3.08727 + 1.29305 \times 10^{-15} i) z + \right. \\
& \left. (3.54375 + 1.82258 \times 10^{-16} i) z^2 - (1.06994 + 2.7717 \times 10^{-16} i) z^3 + \right. \\
& \left. (0.460042 - 8.09106 \times 10^{-17} i) z^4 \right) + \\
& y \left((9.04335 \times 10^{-17} - 3.50407 \times 10^{-16} i) + (6.1771 \times 10^{-16} - 4.34178 \times 10^{-16} i) z - \right. \\
& \left. (3.75544 \times 10^{-17} + 8.34132 \times 10^{-16} i) z^2 + (2.15175 \times 10^{-16} - 5.95225 \times 10^{-16} i) z^3 - \right. \\
& \left. (6.75083 \times 10^{-16} + 1.01676 \times 10^{-16} i) z^4 + (1.84114 \times 10^{-16} + 2.77297 \times 10^{-17} i) z^5 \right) + \\
& x^3 \left((-9.13323 \times 10^{-16} + 6.32853 \times 10^{-17} i) + (2.11177 \times 10^{-16} - 6.86156 \times 10^{-17} i) y^3 + \right. \\
& \left. y^2 \left((-5.625 - 1.89156 \times 10^{-15} i) - (2.74462 \times 10^{-16} + 8.44708 \times 10^{-16} i) z \right) + \right. \\
& \left. (1.11857 \times 10^{-15} - 2.17525 \times 10^{-16} i) z + (1.90025 \times 10^{-16} + 4.052 \times 10^{-16} i) z^2 + \right. \\
& \left. y \left((-1.02923 \times 10^{-16} - 3.16765 \times 10^{-16} i) - (1.18129 \times 10^{-15} - 6.75665 \times 10^{-16} i) z + \right. \right. \\
& \left. \left. (7.39459 \times 10^{-17} - 4.90969 \times 10^{-16} i) z^2 \right) \right) + \\
& x^2 \left((3.09396 + 2.67327 \times 10^{-17} i) - (7.14191 + 3.70557 \times 10^{-16} i) y^4 + \right. \\
& \left. y^3 \left((1.39363 \times 10^{-15} + 1.41495 \times 10^{-15} i) + (2.63971 \times 10^{-16} - 8.57694 \times 10^{-17} i) z \right) - \right. \\
& \left. (3.08727 + 1.31579 \times 10^{-16} i) z + (3.54375 + 3.93435 \times 10^{-16} i) z^2 - \right. \\
& \left. (1.06994 + 5.93935 \times 10^{-16} i) z^3 + (0.460042 - 1.60102 \times 10^{-16} i) z^4 + \right. \\
& \left. y^2 \left((5.49489 - 1.07936 \times 10^{-15} i) - \right. \right. \\
& \left. \left. (6.73184 + 2.4368 \times 10^{-15} i) z - (2.44364 + 1.2216 \times 10^{-15} i) z^2 \right) + \right. \\
& \left. y \left((1.00343 \times 10^{-16} - 4.99546 \times 10^{-16} i) + (4.22354 \times 10^{-16} - 1.37231 \times 10^{-16} i) z + \right. \right. \\
& \left. \left. (1.16414 \times 10^{-15} - 7.28459 \times 10^{-16} i) z^2 + (3.24676 \times 10^{-16} + 1.12421 \times 10^{-17} i) z^3 \right) \right) + \\
& x \left((2.45485 \times 10^{-16} + 3.69729 \times 10^{-17} i) + (4.02535 \times 10^{-16} + 1.61048 \times 10^{-16} i) y^5 + \right. \\
& \left. y^4 \left((2.8125 + 1.36814 \times 10^{-15} i) - (9.13323 \times 10^{-16} - 6.32853 \times 10^{-17} i) z \right) + \right. \\
& \left. (1.28022 \times 10^{-15} + 1.67711 \times 10^{-16} i) z + (1.72106 \times 10^{-15} - 9.22627 \times 10^{-17} i) z^2 + \right. \\
& \left. (1.71539 \times 10^{-16} + 5.27942 \times 10^{-16} i) z^3 + (1.1733 \times 10^{-15} + 3.77555 \times 10^{-16} i) z^4 - \right. \\
& \left. (4.85058 \times 10^{-17} - 3.03524 \times 10^{-17} i) z^5 + y^3 \left((1.5172 \times 10^{-16} + 8.26221 \times 10^{-16} i) - \right. \right. \\
& \left. \left. (2.16507 \times 10^{-16} - 7.70762 \times 10^{-16} i) z + (2.16507 \times 10^{-16} - 7.70762 \times 10^{-16} i) z^2 \right) + \right. \\
& \left. y^2 \left((2.28997 \times 10^{-16} - 1.0359 \times 10^{-16} i) + (5.6792 \times 10^{-17} - 5.43764 \times 10^{-16} i) z + \right. \right. \\
& \left. \left. (1.63146 \times 10^{-15} - 2.16439 \times 10^{-15} i) z^2 + (5.3303 \times 10^{-18} - 7.02146 \times 10^{-16} i) z^3 \right) + \right.
\end{aligned}$$

$$\begin{aligned}
& y \left((9.83441 \times 10^{-17} - 2.36242 \times 10^{-16} i) - (1.79534 \times 10^{-16} - 5.25277 \times 10^{-16} i) z + \right. \\
& \quad \left. (1.18396 \times 10^{-15} - 1.02674 \times 10^{-15} i) z^2 - (8.104 \times 10^{-16} - 3.80051 \times 10^{-16} i) z^3 - \right. \\
& \quad \left. (2.58641 \times 10^{-16} + 6.16377 \times 10^{-16} i) z^4 \right) + \\
r^2 & \left((0.743614 + 2.67338 \times 10^{-16} i) - (2.5 + 2.77556 \times 10^{-16} i) x^8 - \right. \\
& \quad \left. (2.5 + 6.63788 \times 10^{-17} i) y^8 + x^7 \left((1.13499 \times 10^{-15} + 7.98577 \times 10^{-16} i) - \right. \right. \\
& \quad \left. \left. (1.02923 \times 10^{-16} + 3.16765 \times 10^{-16} i) y - (2.62639 \times 10^{-16} + 8.97672 \times 10^{-17} i) z \right) + \right. \\
& \quad y^7 \left((7.46945 \times 10^{-16} + 1.0414 \times 10^{-15} i) + (1.24075 \times 10^{-16} - 1.5705 \times 10^{-16} i) z \right) + \\
& \quad \left. (2.27444 + 6.74867 \times 10^{-16} i) z + (2.75413 + 1.15048 \times 10^{-15} i) z^2 + \right. \\
& \quad \left. (8.42384 + 5.1288 \times 10^{-16} i) z^3 + (3.40015 + 5.8867 \times 10^{-16} i) z^4 + \right. \\
& \quad \left. (10.3998 + 1.57696 \times 10^{-15} i) z^5 + (1.39924 + 1.55347 \times 10^{-16} i) z^6 + \right. \\
& \quad \left. (4.27975 + 6.86325 \times 10^{-16} i) z^7 - (8.57694 \times 10^{-18} + 2.63971 \times 10^{-17} i) z^8 + \right. \\
& \quad y^6 \left((-0.625759 + 1.15307 \times 10^{-16} i) - \right. \\
& \quad \left. (4.27975 + 2.63971 \times 10^{-16} i) z - (7.5 + 4.10313 \times 10^{-16} i) z^2 \right) + \\
x^6 & \left((-0.625759 + 1.01281 \times 10^{-15} i) - (10. + 1.53258 \times 10^{-15} i) y^2 + \right. \\
& \quad y \left((6.28201 \times 10^{-16} + 4.963 \times 10^{-16} i) + (1.92691 \times 10^{-16} + 5.41268 \times 10^{-17} i) z \right) - \\
& \quad \left. (4.27975 + 6.86325 \times 10^{-16} i) z - (7.5 + 8.32667 \times 10^{-16} i) z^2 \right) + \\
y^5 & \left((1.95271 \times 10^{-16} + 8.70439 \times 10^{-16} i) + (3.17347 \times 10^{-16} + 9.76693 \times 10^{-16} i) z + \right. \\
& \quad \left. (1.14815 \times 10^{-15} + 1.37798 \times 10^{-15} i) z^2 - (5.96558 \times 10^{-16} + 3.96381 \times 10^{-17} i) z^3 \right) + \\
y^4 & \left((1.32699 + 8.86445 \times 10^{-16} i) - (2.14248 - 6.06845 \times 10^{-16} i) z - \right. \\
& \quad \left. (3.90228 + 6.44417 \times 10^{-16} i) z^2 - \right. \\
& \quad \left. (4.27975 + 4.75148 \times 10^{-16} i) z^3 - (7.5 + 1.25502 \times 10^{-15} i) z^4 \right) + \\
y^3 & \left((1.22538 \times 10^{-15} + 1.03186 \times 10^{-15} i) + (4.00451 \times 10^{-16} + 1.59174 \times 10^{-15} i) z + \right. \\
& \quad \left. (1.45176 \times 10^{-15} + 6.95653 \times 10^{-16} i) z^2 + (1.61547 \times 10^{-15} - 5.7955 \times 10^{-17} i) z^3 - \right. \\
& \quad \left. (1.06606 \times 10^{-17} - 1.40429 \times 10^{-15} i) z^4 + (3.16426 \times 10^{-17} + 4.56662 \times 10^{-16} i) z^5 \right) + \\
y^2 & \left((1.07486 + 1.01684 \times 10^{-15} i) + (1.73541 + 1.14297 \times 10^{-15} i) z + \right. \\
& \quad \left. (1.44664 + 1.26929 \times 10^{-15} i) z^2 + \right. \\
& \quad \left. (5.60908 + 1.25626 \times 10^{-15} i) z^3 - (1.87728 + 3.14008 \times 10^{-16} i) z^4 + \right. \\
& \quad \left. (4.27975 + 1.10868 \times 10^{-15} i) z^5 - (2.5 + 3.83144 \times 10^{-16} i) z^6 \right) + \\
y & \left((4.4508 \times 10^{-17} + 4.96257 \times 10^{-16} i) - (6.83079 \times 10^{-16} - 9.51544 \times 10^{-16} i) z - \right. \\
& \quad \left. (7.33874 \times 10^{-16} - 7.05393 \times 10^{-16} i) z^2 - (1.27506 \times 10^{-15} - 1.46491 \times 10^{-15} i) z^3 + \right. \\
& \quad \left. (3.43078 \times 10^{-17} + 1.05588 \times 10^{-16} i) z^4 + (1.08254 \times 10^{-16} - 3.85381 \times 10^{-16} i) z^5 - \right. \\
& \quad \left. (3.85381 \times 10^{-16} + 1.08254 \times 10^{-16} i) z^6 - (6.99481 \times 10^{-17} + 3.56404 \times 10^{-17} i) z^7 \right) + \\
x^5 & \left((-1.8225 - 1.4694 \times 10^{-15} i) + (1.10851 \times 10^{-15} + 1.97454 \times 10^{-15} i) y^3 + \right. \\
& \quad y^2 \left((5.59723 \times 10^{-15} + 2.092 \times 10^{-15} i) - (2.85123 \times 10^{-16} - 5.59585 \times 10^{-16} i) z \right) + \\
& \quad \left. (1.81216 \times 10^{-15} - 5.30438 \times 10^{-16} i) z + (3.16232 \times 10^{-15} - 3.27087 \times 10^{-16} i) z^2 - \right. \\
& \quad \left. (2.85123 \times 10^{-16} - 5.59585 \times 10^{-16} i) z^3 + y \left((1.30137 \times 10^{-15} - 3.06105 \times 10^{-16} i) - \right. \right. \\
& \quad \left. \left. (9.55627 \times 10^{-16} - 1.01092 \times 10^{-15} i) z + (6.28201 \times 10^{-16} + 4.963 \times 10^{-16} i) z^2 \right) \right) + \\
x^4 & \left((1.32699 - 1.17253 \times 10^{-15} i) - (15. + 1.66533 \times 10^{-15} i) y^4 + \right. \\
& \quad y^3 \left((-1.9286 \times 10^{-16} + 2.28064 \times 10^{-15} i) + (4.85639 \times 10^{-16} + 7.76092 \times 10^{-16} i) z \right) - \\
& \quad \left. (2.14248 - 2.9008 \times 10^{-16} i) z - (3.90228 - 2.00291 \times 10^{-16} i) z^2 - \right. \\
& \quad \left. (4.27975 + 1.53103 \times 10^{-15} i) z^3 - (7.5 + 8.32667 \times 10^{-16} i) z^4 + \right. \\
& \quad y^2 \left((-1.87728 + 3.90953 \times 10^{-15} i) - \right. \\
& \quad \left. (12.8393 + 2.69251 \times 10^{-15} i) z - (22.5 + 2.498 \times 10^{-15} i) z^2 \right) +
\end{aligned}$$

$$\begin{aligned}
& y \left((2.29663 \times 10^{-16} - 1.91358 \times 10^{-16} i) + (1.90059 \times 10^{-15} - 6.1754 \times 10^{-16} i) z - \right. \\
& \quad \left. (1.06122 \times 10^{-15} - 1.04522 \times 10^{-15} i) z^2 + (3.11435 \times 10^{-16} + 5.99223 \times 10^{-16} i) z^3 \right) + \\
& x^2 \left((1.07486 + 1.72128 \times 10^{-16} i) - (10. + 1.11022 \times 10^{-15} i) y^6 + \right. \\
& \quad y^5 \left((1.63834 \times 10^{-16} + 2.12097 \times 10^{-15} i) - (1.05588 \times 10^{-15} - 3.43078 \times 10^{-16} i) z \right) + \\
& \quad (1.73541 + 6.15023 \times 10^{-16} i) z + (1.44664 + 5.50213 \times 10^{-17} i) z^2 + \\
& \quad (5.60908 + 1.04509 \times 10^{-15} i) z^3 - (1.87728 + 4.19597 \times 10^{-16} i) z^4 + \\
& \quad (4.27975 - 1.58383 \times 10^{-16} i) z^5 - (2.5 + 6.9991 \times 10^{-16} i) z^6 + \\
& \quad y^4 \left((-1.87728 + 2.75722 \times 10^{-18} i) - \right. \\
& \quad \quad \left. (12.8393 + 1.00309 \times 10^{-15} i) z - (22.5 + 2.498 \times 10^{-15} i) z^2 \right) + \\
& \quad y^3 \left((-6.70504 \times 10^{-16} + 4.51331 \times 10^{-16} i) + (2.2803 \times 10^{-15} + 4.8624 \times 10^{-15} i) z - \right. \\
& \quad \quad \left. (1.66378 \times 10^{-16} - 1.10468 \times 10^{-15} i) z^2 - (1.19312 \times 10^{-15} + 7.92762 \times 10^{-17} i) z^3 \right) + \\
& \quad y^2 \left((2.65398 - 2.33291 \times 10^{-16} i) - (4.28495 - 7.91336 \times 10^{-16} i) z - \right. \\
& \quad \quad (7.80456 + 2.13354 \times 10^{-15} i) z^2 - (8.55951 + 1.37265 \times 10^{-15} i) z^3 - \\
& \quad \quad (15. + 1.66533 \times 10^{-15} i) z^4 \right) + y \left((-4.61992 \times 10^{-16} + 7.33789 \times 10^{-16} i) - \right. \\
& \quad \quad (1.76707 \times 10^{-15} - 2.10631 \times 10^{-15} i) z - (3.48408 \times 10^{-16} + 3.53738 \times 10^{-16} i) z^2 - \\
& \quad \quad \left. (2.63971 \times 10^{-15} - 8.57694 \times 10^{-16} i) z^3 - (8.78846 \times 10^{-16} + 2.1659 \times 10^{-15} i) z^4 \right) \Big) + \\
& x^3 \left((4.88014 \times 10^{-16} - 1.14789 \times 10^{-16} i) - (7.07477 \times 10^{-16} - 6.96816 \times 10^{-16} i) y^5 + \right. \\
& \quad y^4 \left((3.36284 \times 10^{-15} + 1.00859 \times 10^{-15} i) - (7.92762 \times 10^{-17} - 1.19312 \times 10^{-15} i) z \right) + \\
& \quad (1.91358 \times 10^{-16} + 2.29663 \times 10^{-16} i) z - (2.34824 \times 10^{-16} + 1.44127 \times 10^{-15} i) z^2 - \\
& \quad (3.141 \times 10^{-16} + 2.4815 \times 10^{-16} i) z^3 + (1.48357 \times 10^{-15} - 1.18246 \times 10^{-15} i) z^4 - \\
& \quad (3.53738 \times 10^{-16} - 3.48408 \times 10^{-16} i) z^5 + y^3 \left((2.1116 \times 10^{-15} + 1.64861 \times 10^{-15} i) + \right. \\
& \quad \quad (6.33192 \times 10^{-16} + 4.46369 \times 10^{-15} i) z - (1.12983 \times 10^{-15} - 8.34047 \times 10^{-16} i) z^2 \Big) + \\
& \quad y^2 \left((18.225 + 3.7128 \times 10^{-15} i) + (5.49559 \times 10^{-15} + 2.18339 \times 10^{-15} i) z + \right. \\
& \quad \quad (5.34271 \times 10^{-15} - 8.02065 \times 10^{-16} i) z^2 - (5.0163 \times 10^{-16} - 1.33035 \times 10^{-15} i) z^3 \Big) + \\
& \quad y \left((2.32353 \times 10^{-15} + 3.24846 \times 10^{-16} i) - (2.35493 \times 10^{-15} - 4.96765 \times 10^{-15} i) z + \right. \\
& \quad \quad (2.64819 \times 10^{-17} - 1.17596 \times 10^{-15} i) z^2 + (1.47553 \times 10^{-16} + 3.6876 \times 10^{-15} i) z^3 - \\
& \quad \quad \left. (6.32853 \times 10^{-17} + 9.13323 \times 10^{-16} i) z^4 \right) \Big) + \\
& x \left((-6.38153 \times 10^{-16} + 2.36532 \times 10^{-16} i) - (3.82716 \times 10^{-16} + 4.59327 \times 10^{-16} i) y^7 + \right. \\
& \quad y^6 \left((3.00944 \times 10^{-16} - 3.31254 \times 10^{-16} i) + (5.6792 \times 10^{-17} - 5.43764 \times 10^{-16} i) z \right) - \\
& \quad (9.47631 \times 10^{-16} + 4.23032 \times 10^{-17} i) z - (6.57348 \times 10^{-16} - 1.03074 \times 10^{-15} i) z^2 - \\
& \quad (2.75046 \times 10^{-15} + 7.40622 \times 10^{-16} i) z^3 - (4.68485 \times 10^{-16} + 7.23298 \times 10^{-16} i) z^4 - \\
& \quad (2.36966 \times 10^{-15} + 1.18537 \times 10^{-15} i) z^5 - (2.4282 \times 10^{-16} + 3.88046 \times 10^{-16} i) z^6 - \\
& \quad (1.39896 \times 10^{-16} + 7.12807 \times 10^{-17} i) z^7 + y^5 \left((-5.3303 \times 10^{-18} + 7.02146 \times 10^{-16} i) + \right. \\
& \quad \quad (8.60529 \times 10^{-16} - 4.61314 \times 10^{-17} i) z - (7.31124 \times 10^{-16} + 8.13065 \times 10^{-16} i) z^2 \Big) + \\
& \quad y^4 \left((-9.1125 + 2.55371 \times 10^{-16} i) + (2.39689 \times 10^{-15} - 1.24574 \times 10^{-15} i) z + \right. \\
& \quad \quad (1.02424 \times 10^{-15} - 7.99739 \times 10^{-16} i) z^2 + (2.79793 \times 10^{-16} + 1.42561 \times 10^{-16} i) z^3 \Big) + \\
& \quad y^3 \left((2.20904 \times 10^{-15} + 3.69996 \times 10^{-15} i) + (3.9987 \times 10^{-16} + 5.12121 \times 10^{-16} i) z - \right. \\
& \quad \quad (7.24631 \times 10^{-16} - 6.44022 \times 10^{-16} i) z^2 - (8.46065 \times 10^{-17} - 1.89526 \times 10^{-15} i) z^3 - \\
& \quad \quad \left. (6.2287 \times 10^{-16} + 1.19845 \times 10^{-15} i) z^4 \right) + \\
& \quad y^2 \left((8.48536 \times 10^{-16} + 1.5337 \times 10^{-15} i) - (2.46435 \times 10^{-15} - 3.1938 \times 10^{-15} i) z + \right. \\
& \quad \quad (1.27031 \times 10^{-15} + 3.1685 \times 10^{-16} i) z^2 - (2.79962 \times 10^{-16} - 2.19221 \times 10^{-15} i) z^3 + \\
& \quad \quad \left. (1.65511 \times 10^{-15} - 6.54513 \times 10^{-16} i) z^4 + (3.43078 \times 10^{-17} + 1.05588 \times 10^{-16} i) z^5 \right) + \\
& \quad y \left((-2.36326 \times 10^{-16} + 1.06904 \times 10^{-15} i) - (9.71448 \times 10^{-16} - 7.82586 \times 10^{-16} i) z + \right.
\end{aligned}$$

$$\begin{aligned} & (5.85897 \times 10^{-16} + 1.44393 \times 10^{-15} i) z^2 - (1.91392 \times 10^{-15} - 2.37291 \times 10^{-15} i) z^3 + \\ & (6.16377 \times 10^{-16} - 2.58641 \times 10^{-16} i) z^4 - (4.80478 \times 10^{-16} - 8.56531 \times 10^{-16} i) z^5 - \\ & (2.26998 \times 10^{-16} + 1.59715 \times 10^{-16} i) z^6) \end{aligned}$$

```
Out[163]= -0.348678 - 0.0234375 r10 + 1.18098 x5 - 1. x10 - 11.8098 x3 y2 + 5.9049 x y4 -
  1. y10 + r9 (-0.060054 + 0.185753 z) - 2.15234 z2 - 2.6572 y2 z2 - 3.2805 y4 z2 -
  4.05 y6 z2 - 5. y8 z2 - 5.31441 z4 - 9.8415 y2 z4 - 12.15 y4 z4 - 10. y6 z4 -
  6.561 z6 - 12.15 y2 z6 - 10. y4 z6 - 4.05 z8 - 5. y2 z8 - 1. z10 + x8 (-5. y2 - 5. z2) +
  r8 (0.320349 + 0.321721 x2 + 0.321721 y2 - 0.761125 z + 0.12071 z2) +
  r7 (1.09752 + x2 (-0.411617 - 0.579429 z) + y2 (-0.411617 - 0.579429 z) +
  0.228602 z - 2.40965 z2 + 0.417427 z3) + x6 (-10. y4 - 4.05 z2 - 20. y2 z2 - 10. z4) +
  r6 (0.7187 - 0.535477 x4 - 0.535477 y4 + 0.343105 z + 2.6187 z2 +
  0.369655 z3 + 0.390625 z4 + y2 (2.83708 - 3.12255 z + 1.13333 z2) +
  x2 (2.83708 - 1.07095 y2 - 3.12255 z + 1.13333 z2)) +
  r5 (-0.00332778 + 0.125 x5 - 1.25 x3 y2 + 0.625 x y4 + y4 (-0.5625 - 1.14546 z) +
  x4 (-0.5625 - 1.14546 z) - 4.13009 z + 0.596421 z2 + 6.42963 z3 - 1.58007 z4 - 0.59441 z5 +
  x2 (0.368608 + y2 (-1.125 - 2.29092 z) + 4.28471 z + 1.6875 z2 + 0.270406 z3) +
  y2 (0.368608 + 4.28471 z + 1.6875 z2 + 0.270406 z3)) +
  x4 (-10. y6 - 3.2805 z2 - 30. y4 z2 - 12.15 z4 - 10. z6 + y2 (-12.15 z2 - 30. z4)) +
  x2 (-5. y8 - 2.65721 z2 - 20. y6 z2 - 9.8415 z4 - 12.15 z6 -
  5. z8 + y4 (-12.15 z2 - 30. z4) + y2 (-6.561 z2 - 24.3 z4 - 20. z6)) +
  r4 (-0.404841 + 0.5625 x5 - 2.38064 x6 - 5.625 x3 y2 + 2.8125 x y4 - 2.38064 y6 -
  2.91037 z - 4.03374 z2 - 4.79072 z3 - 4.92888 z4 - 1.47862 z5 - 0.698771 z6 + y4
  (2.74744 - 3.36592 z - 1.22182 z2) + x4 (2.74744 - 7.14191 y2 - 3.36592 z - 1.22182 z2) +
  y2 (3.09396 - 3.08727 z + 3.54375 z2 - 1.06994 z3 + 0.460042 z4) +
  x2 (3.09396 - 7.14191 y4 - 3.08727 z + 3.54375 z2 - 1.06994 z3 +
  0.460042 z4 + y2 (5.49489 - 6.73184 z - 2.44364 z2)) +
  r2 (0.743614 - 1.8225 x5 - 2.5 x8 + 18.225 x3 y2 - 9.1125 x y4 - 2.5 y8 + 2.27444 z +
  2.75413 z2 + 8.42384 z3 + 3.40015 z4 + 10.3998 z5 + 1.39924 z6 + 4.27975 z7 +
  x6 (-0.625759 - 10. y2 - 4.27975 z - 7.5 z2) + y6 (-0.625759 - 4.27975 z - 7.5 z2) +
  y4 (1.32699 - 2.14248 z - 3.90228 z2 - 4.27975 z3 - 7.5 z4) +
  y2 (1.07486 + 1.73541 z + 1.44664 z2 + 5.60908 z3 - 1.87728 z4 + 4.27975 z5 - 2.5 z6) +
  x4 (1.32699 - 15. y4 - 2.14248 z - 3.90228 z2 - 4.27975 z3 - 7.5 z4 +
  y2 (-1.87728 - 12.8393 z - 22.5 z2)) + x2 (1.07486 - 10. y6 + 1.73541 z + 1.44664 z2 +
  5.60908 z3 - 1.87728 z4 + 4.27975 z5 - 2.5 z6 + y4 (-1.87728 - 12.8393 z - 22.5 z2) +
  y2 (2.65398 - 4.28495 z - 7.80456 z2 - 8.55951 z3 - 15. z4))
```

In[164]:=

In[165]:= **step = 1/10;**

In[166]:= **plots2 =**

```
ParallelTable[ContourPlot3D[-0.34867844010000004` - 0.023437500000000003` r10 +
  1.1809799999999997` x5 - 1.0000000000000002` x10 - 11.809799999999997` x3 y2 +
  5.9049000000000001` x y4 - 1.0000000000000002` y10 +
```

$$\begin{aligned}
& r^9 \left(-0.060054044501930894 + 0.18575322583889714 z \right) - 2.152336050000001 z^2 - \\
& 2.657205 y^2 z^2 - 3.2805000000000044 y^4 z^2 - 4.050000000000002 y^6 z^2 - \\
& 5. y^8 z^2 - 5.314410000000001 z^4 - 9.841500000000003 y^2 z^4 - \\
& 12.150000000000007 y^4 z^4 - 10. y^6 z^4 - 6.561000000000001 z^6 - \\
& 12.150000000000004 y^2 z^6 - 10. y^4 z^6 - 4.05 z^8 - 5. y^2 z^8 - 1.000000000000002 z^{10} + \\
& x^8 \left(-5. y^2 - 5. z^2 \right) + r^8 \left(0.32034904515521356 + 0.3217214053710856 x^2 + \right. \\
& \quad \left. 0.32172140537108557 y^2 - 0.7611252850722215 z + 0.12070976342771383 z^2 \right) + \\
& r^7 \left(1.0975157552328203 + x^2 \left(-0.4116165445019309 - 0.579429241524403 z \right) + \right. \\
& \quad \left. y^2 \left(-0.4116165445019309 - 0.579429241524403 z \right) + \right. \\
& \quad \left. 0.2286015049475555 z - 2.409645222509655 z^2 + 0.4174271745131439 z^3 \right) + \\
& x^6 \left(-10. y^4 - 4.0500000000000025 z^2 - 20. y^2 z^2 - 10. z^4 \right) + \\
& r^6 \left(0.7187004609066464 - 0.5354767161132569 x^4 - 0.5354767161132568 y^4 + \right. \\
& \quad \left. 0.3431051301118586 z + 2.6187025366494203 z^2 + 0.3696546882087657 z^3 + \right. \\
& \quad \left. 0.3906250000000001 z^4 + y^2 \left(2.837076620413903 - 3.1225521078773855 z + \right. \right. \\
& \quad \left. \left. 1.133326391308454 z^2 \right) + x^2 \left(2.837076620413903 - 1.0709534322265128 y^2 - \right. \right. \\
& \quad \left. \left. 3.122552107877386 z + 1.1333263913084548 z^2 \right) \right) + \\
& r^5 \left(-0.003327778130289217 + 0.12499999999999999 x^5 - 1.25 x^3 y^2 + \right. \\
& \quad \left. 0.625 x y^4 + x^4 \left(-0.5625000000000002 - 1.145458996708665 z \right) + \right. \\
& \quad \left. y^4 \left(-0.5625000000000002 - 1.1454589967086646 z \right) - \right. \\
& \quad \left. 4.130088045440522 z + 0.5964208680620854 z^2 + 6.4296310077250425 z^3 - \right. \\
& \quad \left. 1.5800720593359074 z^4 - 0.5944103226844709 z^5 + \right. \\
& \quad \left. x^2 \left(0.36860836806208536 + y^2 \left(-1.1250000000000002 - 2.290917993417329 z \right) + \right. \right. \\
& \quad \left. \left. 4.2847125494111715 z + 1.6875000000000009 z^2 + 0.27040618866195265 z^3 \right) + \right. \\
& \quad \left. y^2 \left(0.3686083680620855 + 4.284712549411172 z + 1.6875 z^2 + \right. \right. \\
& \quad \left. \left. 0.27040618866195293 z^3 \right) \right) + x^4 \left(-10. y^6 - 3.280500000000002 z^2 - \right. \\
& \quad \left. 30.000000000000004 y^4 z^2 - 12.150000000000004 z^4 - 10. z^6 + \right. \\
& \quad \left. y^2 \left(-12.150000000000007 z^2 - 30.000000000000004 z^4 \right) \right) + \\
& x^2 \left(-5. y^8 - 2.6572050000000016 z^2 - 20. y^6 z^2 - 9.841500000000003 z^4 - \right. \\
& \quad \left. 12.150000000000004 z^6 - 5. z^8 + \right. \\
& \quad \left. y^4 \left(-12.150000000000013 z^2 - 30.000000000000004 z^4 \right) + \right. \\
& \quad \left. y^2 \left(-6.561000000000001 z^2 - 24.300000000000008 z^4 - 20. z^6 \right) \right) + \\
& r^4 \left(-0.4048408096446578 + 0.5625000000000002 x^5 - 2.3806356214843434 x^6 - \right. \\
& \quad \left. 5.624999999999999 x^3 y^2 + 2.8124999999999996 x y^4 - \right. \\
& \quad \left. 2.3806356214843425 y^6 - 2.9103652912052547 z - 4.0337360312088615 z^2 - \right. \\
& \quad \left. 4.790724759185604 z^3 - 4.928884413609268 z^4 - 1.478618752835064 z^5 - \right. \\
& \quad \left. 0.698771242968684 z^6 + x^4 \left(2.747444560206951 - 7.141906864453027 y^2 - \right. \right. \\
& \quad \left. \left. 3.365917677673142 z - 1.2218218925782893 z^2 \right) + \right. \\
& \quad \left. y^4 \left(2.7474445602069513 - 3.365917677673142 z - 1.221821892578289 z^2 \right) + \right. \\
& \quad \left. y^2 \left(3.0939564062793856 - 3.087273299415729 z + 3.543750000000001 z^2 - \right. \right. \\
& \quad \left. \left. 1.0699385808320474 z^3 + 0.4600424859373682 z^4 \right) + \right. \\
& \quad \left. x^2 \left(3.0939564062793856 - 7.141906864453026 y^4 - 3.087273299415728 z + \right. \right. \\
& \quad \left. \left. 3.5437499999999997 z^2 - 1.0699385808320487 z^3 + 0.4600424859373689 z^4 + \right. \right. \\
& \quad \left. \left. y^2 \left(5.494889120413902 - 6.731835355346286 z - 2.443643785156578 z^2 \right) \right) \right) + \\
& r^2 \left(0.7436138164720766 - 1.8225000000000005 x^5 - 2.5 x^8 + \right.
\end{aligned}$$

$$\begin{aligned}
 &18.224999999999994 \cdot x^3 y^2 - 9.112500000000002 \cdot x y^4 - 2.5 \cdot y^8 + \\
 &2.2744369173438574 \cdot z + 2.7541252461928765 \cdot z^2 + 8.423840434606882 \cdot z^3 + \\
 &3.400154624929478 \cdot z^4 + 10.399803005687508 \cdot z^5 + 1.3992405863907322 \cdot z^6 + \\
 &4.2797543233281905 \cdot z^7 + x^6 (-0.6257594136092682 \cdot - \\
 &\quad 10. \cdot y^2 - 4.279754323328192 \cdot z - 7.500000000000001 \cdot z^2) + \\
 &y^6 (-0.6257594136092683 \cdot - 4.279754323328192 \cdot z - 7.5 \cdot z^2) + \\
 &y^4 (1.326990125023508 \cdot - 2.142477244606064 \cdot z - 3.902278240827805 \cdot z^2 - \\
 &\quad 4.2797543233281905 \cdot z^3 - 7.500000000000001 \cdot z^4) + y^2 (1.0748620012690413 \cdot + \\
 &\quad 1.7354065681309112 \cdot z + 1.4466447499529849 \cdot z^2 + 5.609078246501902 \cdot z^3 - \\
 &\quad 1.8772782408278064 \cdot z^4 + 4.279754323328192 \cdot z^5 - 2.5 \cdot z^6) + \\
 &x^4 (1.3269901250235068 \cdot - 15.000000000000002 \cdot y^4 - 2.142477244606064 \cdot z - \\
 &\quad 3.902278240827805 \cdot z^2 - 4.279754323328192 \cdot z^3 - 7.500000000000001 \cdot z^4 + \\
 &\quad y^2 (-1.877278240827809 \cdot - 12.83926296998458 \cdot z - 22.499999999999996 \cdot z^2)) + \\
 &x^2 (1.0748620012690413 \cdot - 10. \cdot y^6 + 1.7354065681309139 \cdot z + \\
 &\quad 1.4466447499529849 \cdot z^2 + 5.609078246501902 \cdot z^3 - \\
 &\quad 1.8772782408278057 \cdot z^4 + 4.279754323328192 \cdot z^5 - 2.5 \cdot z^6 + \\
 &\quad y^4 (-1.8772782408278106 \cdot - 12.83926296998458 \cdot z - 22.499999999999996 \cdot z^2) + \\
 &\quad y^2 (2.6539802500470135 \cdot - 4.28495448921213 \cdot z - 7.8045564816556166 \cdot z^2 - \\
 &\quad 8.559508646656385 \cdot z^3 - 15.000000000000002 \cdot z^4)) = 0,
 \end{aligned}$$

{x, -1.25, 1.25}, {y, -1.25, 1.25}, {z, -1.25, 1.25},

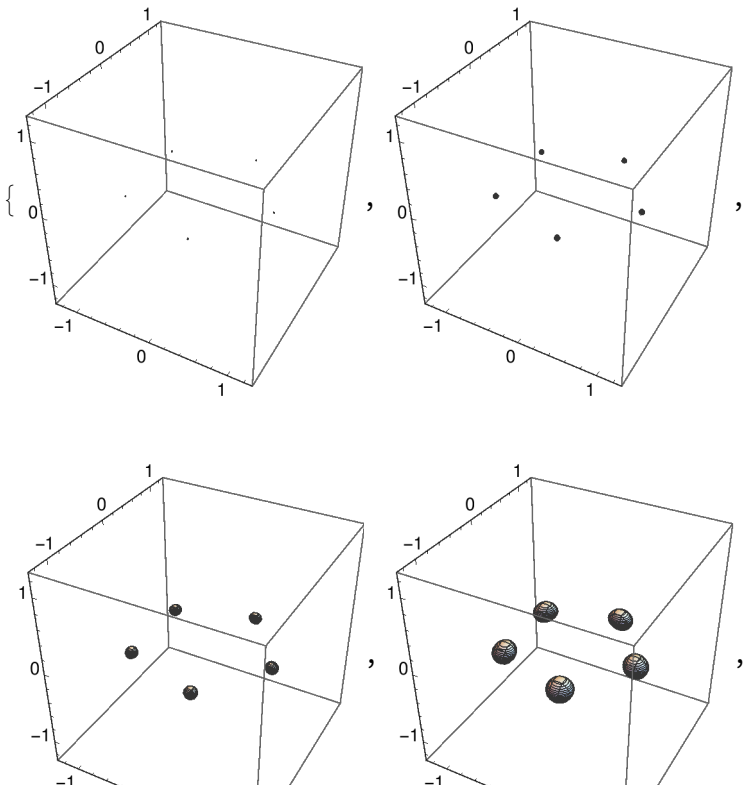
Contours →

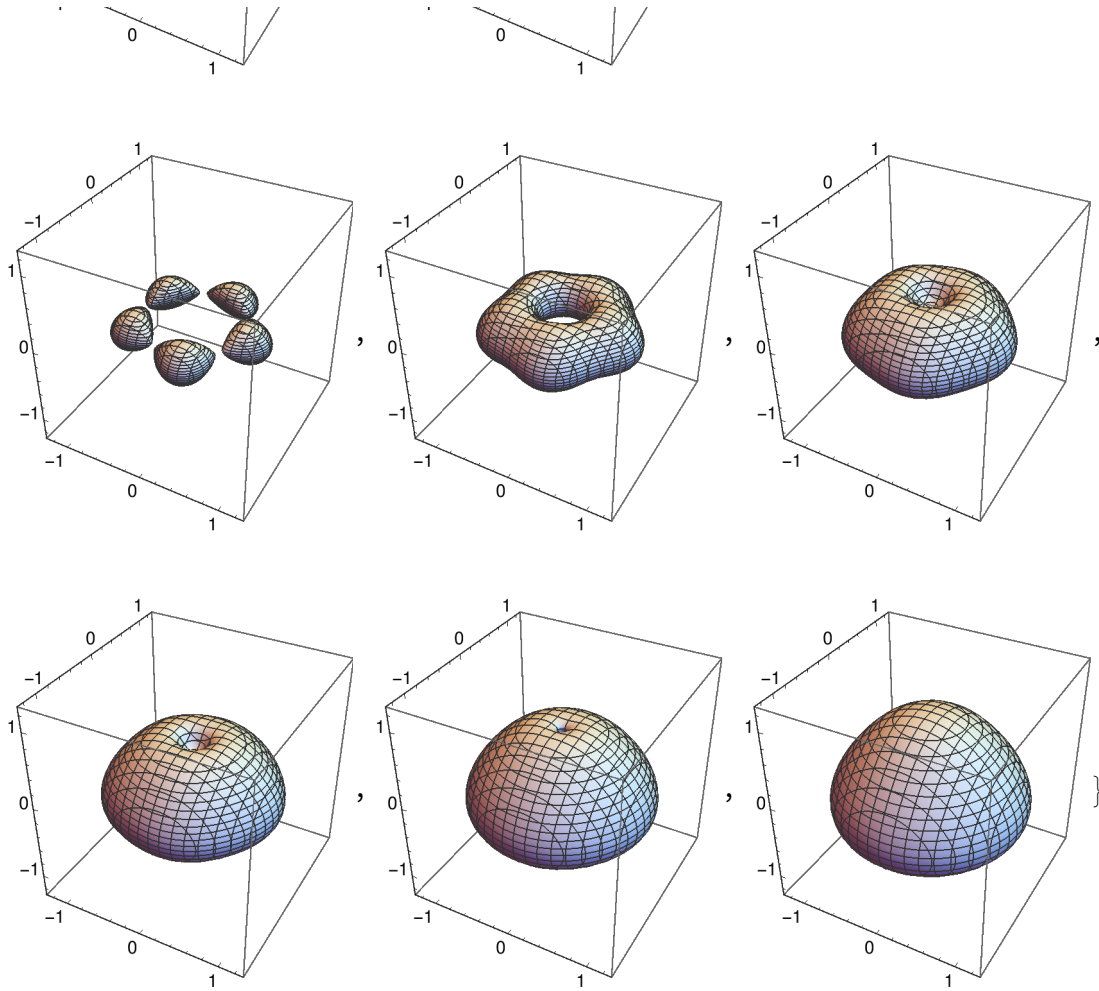
{{1, LightBlue}},

PlotPoints → 50], {r, step, 1,

step}]

Out[166]=





```
In[167]:= Export["T5_step1.eps", plots2[[4]], ImageSize -> 3.2 * 72];
```

```
In[168]:= Export["T5_step2.eps", plots2[[6]], ImageSize -> 3.2 * 72];
```

```
In[169]:= Export["T5_step3.eps", plots2[[7]], ImageSize -> 3.2 * 72];
```

```
In[170]:= Export["T5_step4.eps", plots2[[10]], ImageSize -> 3.2 * 72];
```

```
In[171]:= plotsall = Join[plots2, Reverse[plots2]];
```

```
In[172]:= Export["C5scale.avi", plotsall, ImageResolution -> 300, "FrameRate" -> 10]
```

```
Out[172]= C5scale.avi
```