

```

J0 = {{-sigma, sigma, 0}, {r - z, -1, -x}, {y, x, -b}};
{{-sigma, sigma, 0}, {r - z, -1, -x}, {y, x, -b}};
J = J0 /. {sigma -> 10, b -> 8/3, r -> 28};
eigens = Eigenvalues[J];

eigens1 = eigens /. {x -> 0, y -> 0, z -> 0};
AnyTrue[{Re[Evaluate[eigens1[[1]]]],
  Re[Evaluate[eigens1[[2]]]], Re[Evaluate[eigens1[[3]]]]}, LessThan[0]]

eigens2 = eigens /. {x -> -sqrt(6)/2, y -> -sqrt(6)/2, z -> 27};
AnyTrue[{Re[Evaluate[eigens1[[1]]]],
  Re[Evaluate[eigens1[[2]]]], Re[Evaluate[eigens1[[3]]]]}, LessThan[0]]

eigens2 = eigens /. {x -> sqrt(6)/2, y -> sqrt(6)/2, z -> 27};
AnyTrue[{Re[Evaluate[eigens1[[1]]]],
  Re[Evaluate[eigens1[[2]]]], Re[Evaluate[eigens1[[3]]]]}, LessThan[0]]

```

```
Tr[J0]
```

Out[]= True

Out[]= True

Out[]= True

Out[]= -1 - b - sigma

```
In[392]:= ClearAll["Global`*"]
```

```
sigma0 = 10;
```

```
b0 = 8/3;
```

```
r0 = 28;
```

```
tMax = 22;
```

```
sol[u_, v_, w_] := NDSolve[{x'[t] == sigma0 * (y[t] - x[t]),
  y'[t] == r0 * x[t] - y[t] - x[t] * z[t],
  z'[t] == x[t] * y[t] - b0 * z[t],
  x[0] == u,
  y[0] == v,
  z[0] == w},
  {x, y, z},
  {t, 0, tMax}];
```

```
TableFinal = {{-1, -1, -1}, {-1, -1, 1}, {-1, 1, 1}, {-1, 1, -1},
  {1, 1, -1}, {1, -1, -1}, {1, -1, 1}, {1, 1, 1}, {1, 1, -1}, {1, 1, -1}};
```

```
TableFinal = {{-1, -1, -1}, {-1, 1, 1}, {1, -1, -1}, {1, 1, 1}};
```

```
title =
```

```
"Trajectories of solutions of the Lorenz equations with start points near the origin
, t ∈ [1, 20]";
```

```
Show[Table[ParametricPlot3D[Evaluate[{x[t], y[t], z[t]} /.
```

```
sol[TableFinal[[i, 1]], TableFinal[[i, 2]], TableFinal[[i, 3]]], {t, 1, tMax},
  PlotRange → All, AxesLabel → {x, y, z}, PlotLabel → Style[title, FontSize → 12]] /.
  Line[x_] → {Arrowheads[{0, 0, 0, 0}], Arrow[x]}, {i, Length[TableFinal]}]]
```

Trajectories of solutions of the Lorenz equations with start points near the origin, $t \in [1, 20]$



