DiffEqSolutions

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1 DiffEq Solutions

1.1 Solution to the Lorenz Problem

```
In [1]: using DifferentialEquations

        f = @ode_def_nohes LorenzExample begin
          dx = σ*(y-x)
          dy = x*(ρ-z) - y
          dz = x*y - β*z
        end σ=>10.0 ρ=>28.0 β=>2.6666

        u0 = big([0.1;0.0;0.0])
        tspan = (big(0.0),big(100.0))
        prob = ODEProblem(f,u0,tspan)
        sol = solve(prob);

In [2]: using Plots; plotly(); plot(sol)

In [3]: plot(sol,vars=(:x,:y,:z))
```

1.2 Solution to the Ball Bounce Problem

```
In [4]: f = function (t,u,du)
          du[1] = u[2]
          du[2] = -9.81
        end

        condtion = function (t,u,integrator) # Event when event_f(t,u,k) == 0
          u[1]
        end

        affect! = nothing
        affect_neg! = function (integrator)
          integrator.u[2] = -0.8integrator.u[2]
        end

        callback = ContinuousCallback(condtion,affect!,affect_neg!,interp_points=10
```

```
u0 = [50.0,0.0]
tspan = (0.0,15.0)
prob = ODEProblem(f,u0,tspan)


sol = solve(prob,Tsit5(),callback=callback,adaptive=false,dt=1/4)
plot(sol)
```