```
%%%
%%% First pass for a simple house model
%%%


% Some constants
% m^2 (
area_window = 2.6*5;
area_tile = 4*4;
area_wall_1 = 3*5;
area_wall_2 = 3*5.1;
area_floor_ciel = 5.1*5*2;
area_walls = (area_wall_1 + area_wall_2)*2 + area_floor_ciel;
% )
% m (
thickness_wall = 0.015;
thickness_tile = 0.3;
% )
volume_tile = area_tile * thickness_tile; % m^3
h_window = 0.7;                % W/(m^2)K
k_fiberglass = 0.04;           % W/mK
density_tile = 3000;           % kg/m^3
C_tile = 800;                  % J/(kg)K
mass_tile = volume_tile * density_tile; %kg
h_indoor = 15;                 % W/(m^2)K
h_outdoor = 30;                % W/(m^2)K
T_outdoor = -3;                % C

% Calculate individual resistances
CONV_tile_air = convection_resistance(h_indoor, area_tile);
CONV_air_wall = convection_resistance(h_indoor, area_walls);
COND_through_wall = conduction_resistance(thickness_wall,↙
k_fiberglass, area_walls);
CONV_wall_air = convection_resistance(h_outdoor, area_walls);
```

```
CONV_air_window = convection_resistance(h_window,↙
area_window);
%COND_through_window = conduction_resistance(thickness_wall,↙
k_fiberglass, area_walls);
%maybe not needed ^^
CONV_window_air = convection_resistance(h_window,↙
area_window);
R_wall = (CONV_air_wall + COND_through_wall + CONV_wall_air);
R_window = (CONV_air_window + CONV_window_air);
R_tot = CONV_tile_air + parallel_adder(R_wall, R_window);

days = 10;
tspan = [0, days*86400];
T_0 = T_outdoor;
[t, T] = ode45(@(t,T) (solar_flux(t, area_window)-((T-↙
T_outdoor)/R_tot))*(1/(mass_tile*C_tile)), tspan, T_0);
t_days  = t/86400;
figure()
plot(t_days, T, '--')
title('Inside Air Temperature of House over Time')
xlabel('Time(days)')
ylabel('Temperature(C)')
max(T)
mean(T)

% calculates the conduction resistance given thickness (L),↙
thermal
% conductivity (k), and cross-sectional area (A)
function f = conduction_resistance(L, k, A)
    f = L/(k*A);
end

% calculates the convection resistance given heat transfer↙
coefficient (h)
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% and cross-sectional area (A)
function f = convection_resistance(h, A)
    f = 1/(h*A);
end

% adds two resistances in parallel
function f = parallel_adder(a, b)
    f = 1/((1/a) + (1/b));
end

% calculates solar flux given a time (t) and window area A
function f = solar_flux(t, A)
    f = A *(-361*cos((pi*t)/(12*3600)) + 224*cos((pi*t)/↙
(6*3600)) + 210); % W/(m^2)
end
```

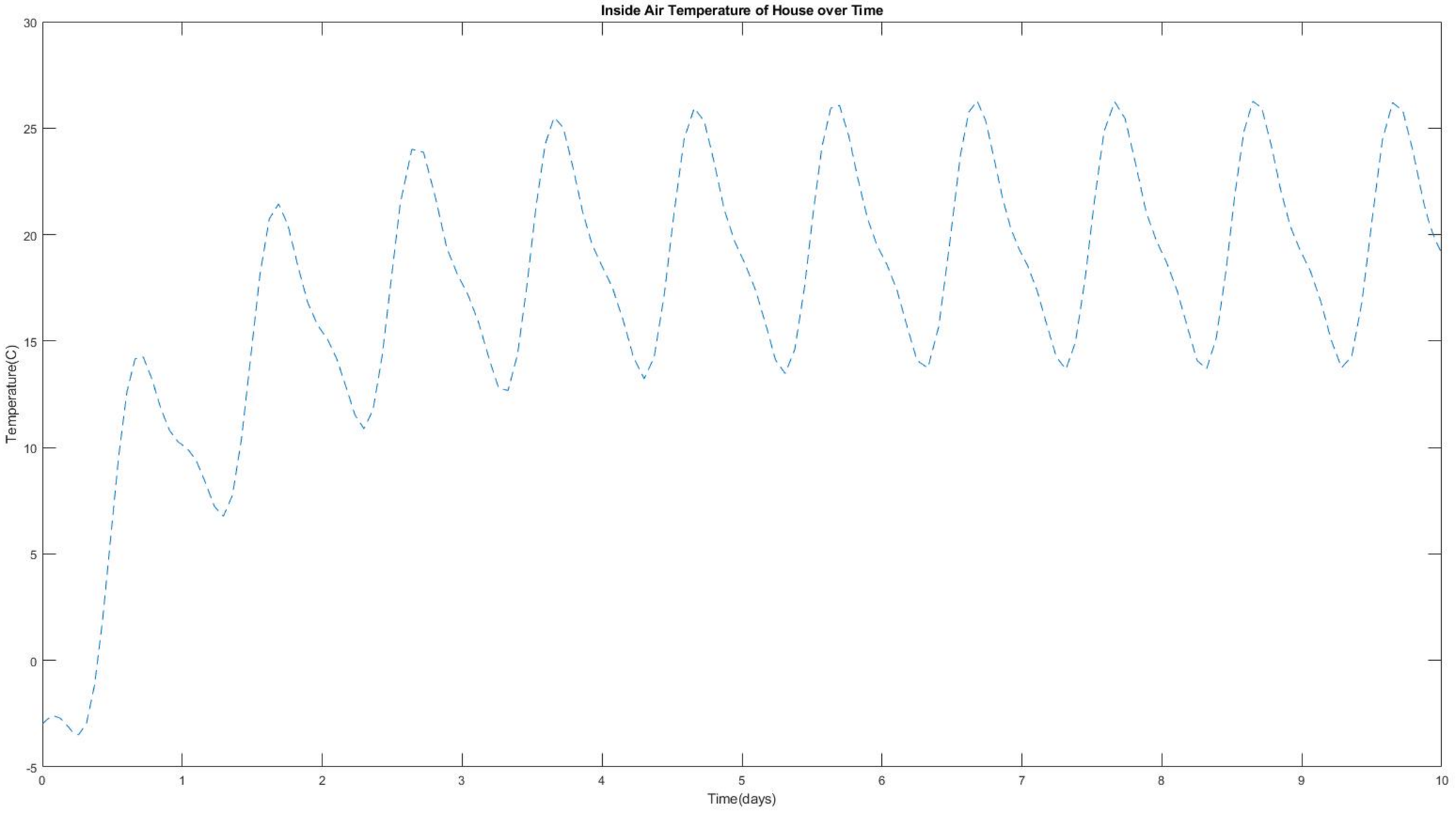
Inside Air Temperature of House over Time
Temperature(C)
Time(days)
30
25
20
15
10
5
0
-5
0
1
2
3
4
5
6
7
8
9
10