

Table 1 – Model Overview

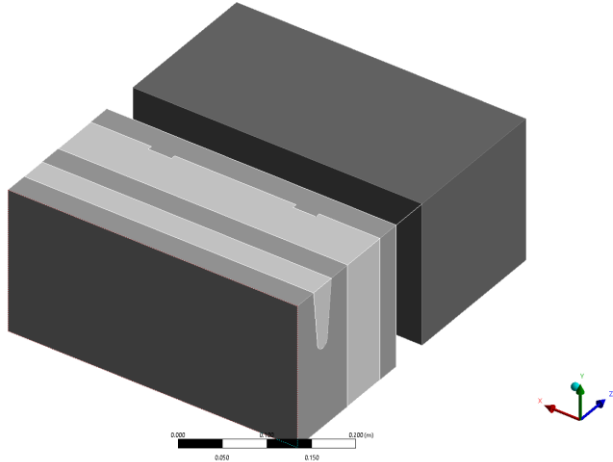
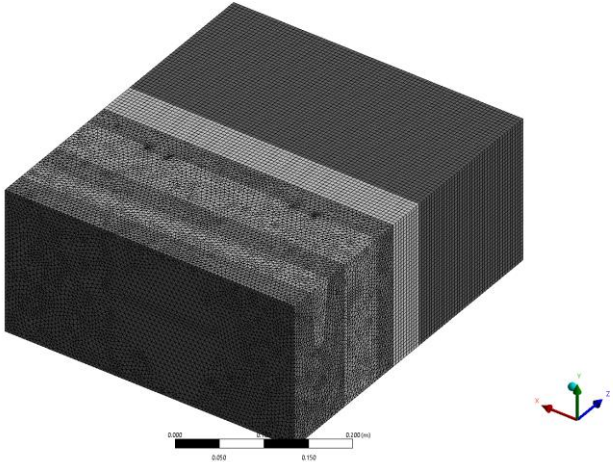
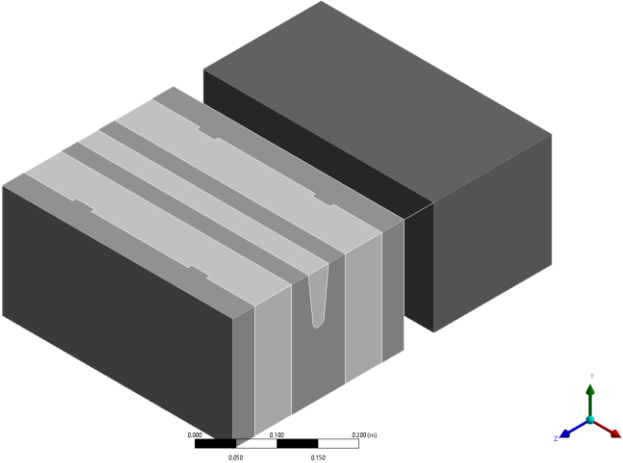
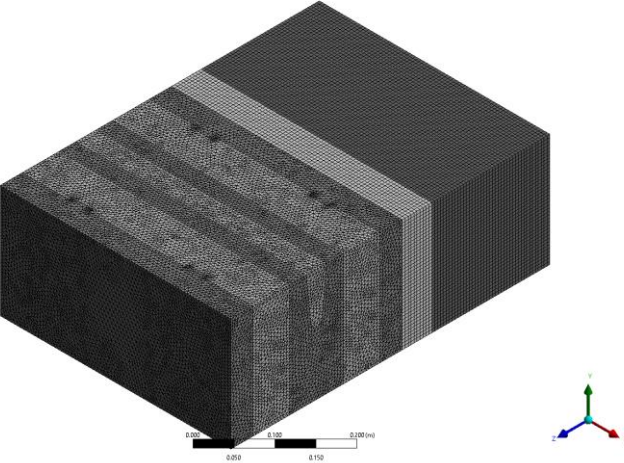
	Model	Mesh
<p>8x8x16 Insul-Block with Concrete Wall</p>	<p><small>C: 8x8 with Concrete Solutions Time: 1:1 9/27/2021 1:24 PM</small></p>  <p>The model shows a 3D perspective of a concrete wall section with an insulating block. The wall is dark gray, and the insulating block is a lighter gray. A scale bar at the bottom indicates dimensions from 0.000 to 0.200 meters. A 3D coordinate system (X, Y, Z) is shown at the bottom right.</p>	 <p>The mesh view shows the same 3D model with a fine, structured grid applied to the surfaces. A scale bar at the bottom indicates dimensions from 0.000 to 0.200 meters. A 3D coordinate system (X, Y, Z) is shown at the bottom right.</p>
<p>12x8x16 Insul-Block with Concrete Wall</p>	<p><small>D: 12x8 with Concrete Solutions Time: 1:1 9/27/2021 1:28 PM</small></p>  <p>The model shows a 3D perspective of a concrete wall section with a larger insulating block. The wall is dark gray, and the insulating block is a lighter gray. A scale bar at the bottom indicates dimensions from 0.000 to 0.200 meters. A 3D coordinate system (X, Y, Z) is shown at the bottom right.</p>	 <p>The mesh view shows the same 3D model with a fine, structured grid applied to the surfaces. A scale bar at the bottom indicates dimensions from 0.000 to 0.200 meters. A 3D coordinate system (X, Y, Z) is shown at the bottom right.</p>

Table 2 – Material Properties

Material	Thermal Conductivity [W/mK]
Concrete – mix design Oven-Dry	0.479 <sup>1</sup>
Type VIII EPS Cellofoam <sup>®</sup>	0.03675
Air	0.02624
Concrete – 140pcf	1.19 <sup>1</sup>

Table 3 – Boundary Conditions

Property	Value
Exterior Air Temperature [°C]	29.00
Interior Air Temperature [°C]	19.00
Mean Temperature [°C]	24.00
Temperature Gradient [°C]	10.00
Exterior Heat Transfer Coefficient [W/m <sup>2</sup> K]	33.4 <sup>2</sup>
Interior Heat Transfer Coefficient [W/m <sup>2</sup> K]	8.4
Surface Emissivity [-]	0.9

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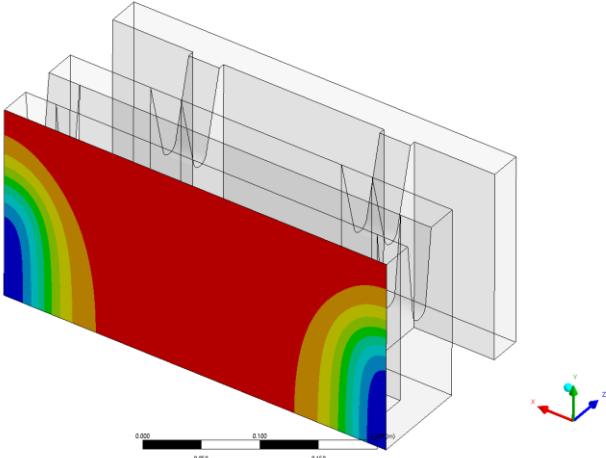
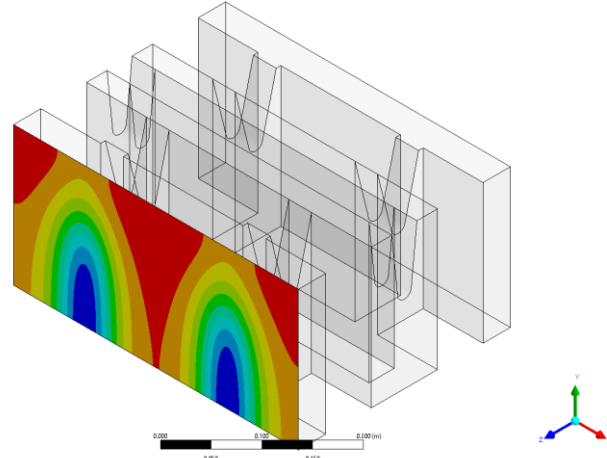
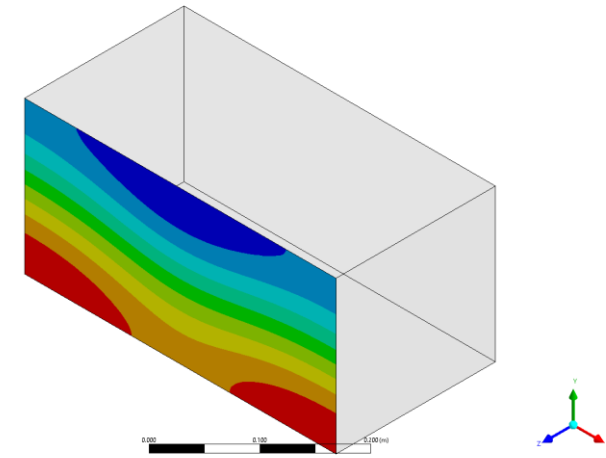
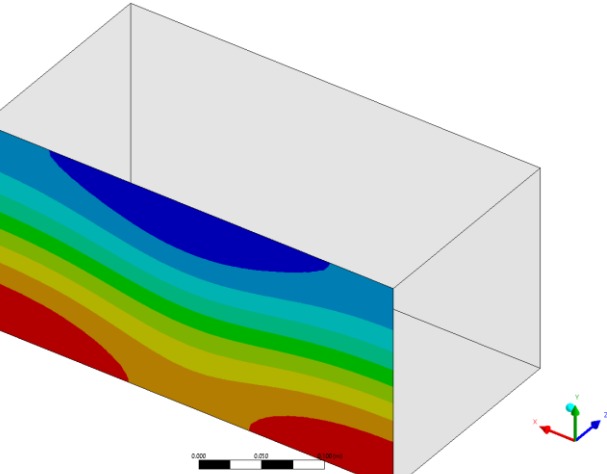
<sup>1</sup> Data obtained from ACI 122R-02

<sup>2</sup> Air film values are taken from ASHRE handbook of fundamentals chapter 26

Table 4 – Numerical Results

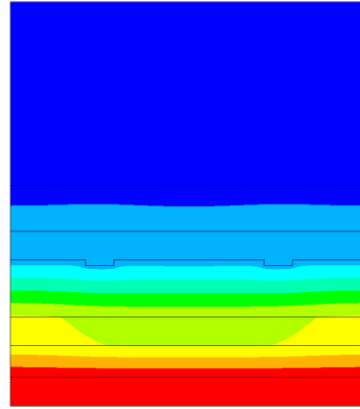
Property	8x8x16 Insul-Block with Concrete Wall	12x8x16 Insul-Block with Concrete Wall
Exterior Surface Temperature [C]	28.87	28.91
Interior Surface Temperature [C]	19.52	19.37
Exterior Surface Heat Flux [W/m <sup>2</sup> ]	4.407	3.002
Interior Surface Heat Flux [W/m <sup>2</sup> ]	4.399	3.075
R-value Oven Dry – With Air Film <sup>ii</sup> [ft <sup>2</sup> °Fhr/BTU]	12.91	18.70
U-factor Oven Dry – With Air Film <sup>ii</sup> [BTU/ft <sup>2</sup> °Fhr]	0.07746	0.05349

Table 5 – Graphical Results

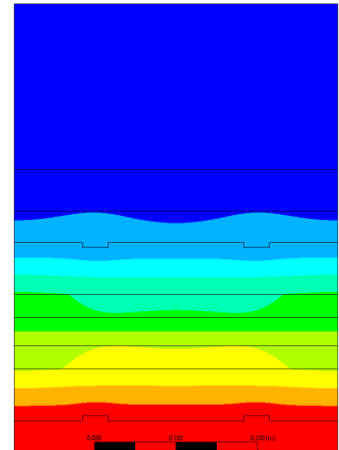
Property	8x8 Insul-Block with Concrete Wall	12x8 Insul-Block with Concrete Wall
Interior Surface Temperature	<p data-bbox="401 326 464 375">C: 8x8 with Concrete Temperature Type: Temperature Unit: °C Time: 1 5/27/2021 1:26:26M</p> 	<p data-bbox="1163 326 1226 375">D: 12x8 with Concrete Temperature Type: Temperature Unit: °C Time: 1 5/27/2021 1:29:26M</p> 
Exterior Surface Temperature	<p data-bbox="401 878 464 927">C: 8x8 with Concrete Temperature Type: Temperature Unit: °C Time: 1 5/27/2021 1:26:26M</p> 	<p data-bbox="1163 878 1226 927">D: 12x8 with Concrete Temperature Type: Temperature Unit: °C Time: 1 5/27/2021 1:30:26M</p> 

Temperature Gradient – Top

C: Ball with Concrete  
 Temperature 3  
 Type: Temperature  
 Unit: °C  
 Time: 1  
 5/27/2011 1:27 PM

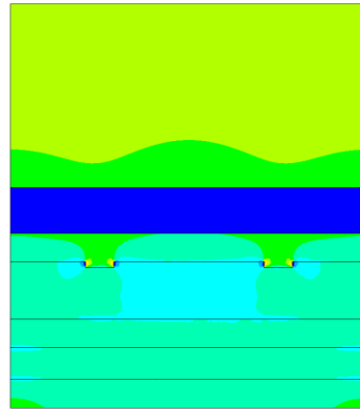


D: 12x8 with Concrete  
 Temperature 3  
 Type: Temperature  
 Unit: °C  
 Time: 1  
 5/27/2011 1:31 PM

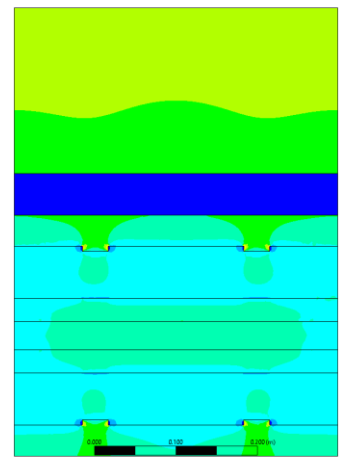


Heat Flux – Top

C: Ball with Concrete  
 Directional Heat Flux 3  
 Type: Directional Heat Flux(Z, Axis)  
 Unit: W/m²  
 Global Coordinate System  
 Time: 1  
 5/27/2011 1:27 PM

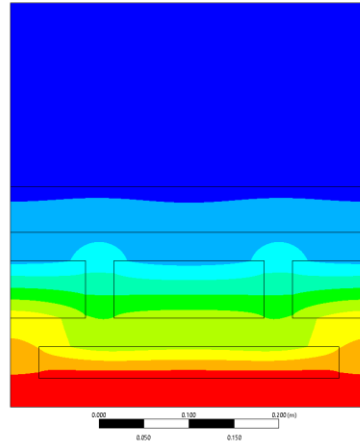


D: 12x8 with Concrete  
 Directional Heat Flux 3  
 Type: Directional Heat Flux(Z, Axis)  
 Unit: W/m²  
 Global Coordinate System  
 Time: 1  
 5/27/2011 1:31 PM

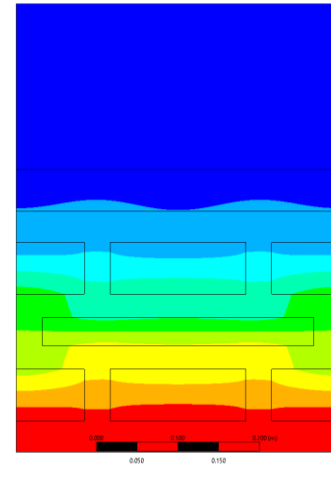


Temperature Gradient – Bottom

C: Ball with Concrete  
 Temperature 4  
 Type: Temperature  
 Unit: °C  
 Time: 1  
 5/27/2011 1:27 PM

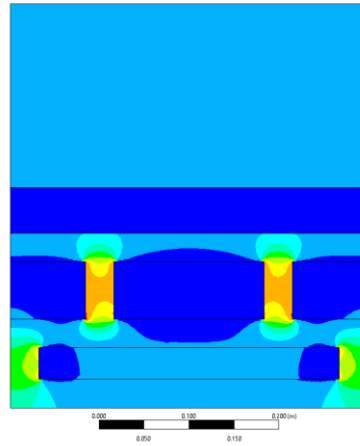


D: 12x8 with Concrete  
 Temperature 4  
 Type: Temperature  
 Unit: °C  
 Time: 1  
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Heat Flux - Bottom

C: Ball with Concrete  
 Directional Heat Flux 4  
 Type: Directional Heat Flux(Z Axis)  
 Unit: W/m^2  
 Global Coordinate System  
 Time: 1  
 5/27/2011 1:27 PM



D: 12x8 with Concrete  
 Directional Heat Flux 4  
 Type: Directional Heat Flux(Z Axis)  
 Unit: W/m^2  
 Global Coordinate System  
 Time: 1  
 5/27/2011 1:32 PM

