Appendix E

Resultant homogeneous second-order relations for the effective thermal conductivities of the three different unit cell types. Again, the Y-intercept was assumed zero due to the comparatively low thermal resistance of air.

Simple Cube:

$$Kxx(x,y,z) = 77.287\emptyset x^2 + 36.415\emptyset y^2 + 36.360\emptyset z^2 + 28.374\emptyset x\emptyset y + 28.3424\emptyset x\emptyset z - 24.271\emptyset y\emptyset z + 28.345\emptyset x - 20.039\emptyset y - 19.98\emptyset z$$

$$Kyy(x,y,z) = 36.367\emptyset x^2 + 77.293\emptyset y^2 + 35.421\emptyset z^2 + 28.328\emptyset x\emptyset y - 24.285\emptyset x\emptyset z + 28.360\emptyset y\emptyset z - 19.977\emptyset x + 28.348\emptyset y - 20.036\emptyset z$$

$$Kzz(x,y,z) = 36.425\emptyset x^2 + 36.371\emptyset y^2 + 77.297\emptyset z^2 - 24.290\emptyset x\emptyset y + 28.354\emptyset x\emptyset z + 28.323\emptyset y\emptyset z - 20.036\emptyset x - 19.977\emptyset y + 28.348\emptyset z$$

Ultra Cube:

$$Kxx(x,y,z) = 232.045\emptyset x^2 + 176.688\emptyset y^2 + 176.715\emptyset z^2 - 205.445\emptyset x\emptyset y - 205.443\emptyset x\emptyset z - 120.530\emptyset y\emptyset z + 26.423\emptyset x + 37.803\emptyset y + 37.777\emptyset z$$

$$Kyy(x,y,z) = 176.721\emptyset x^2 + 232.051\emptyset y^2 + 176.694\emptyset z^2 - 205.458\emptyset x\emptyset y - 120.544\emptyset x\emptyset z - 205.460\emptyset y\emptyset z + 37.779\emptyset x + 26.426y + 37.806\emptyset z$$

$$Kzz(x,y,z) = 176.698\emptyset x^2 + 176.725\emptyset y^2 + 232.055\emptyset z^2 - 120.549\emptyset x\emptyset y - 205.465\emptyset x\emptyset z - 205.463\emptyset y\emptyset z + 37.806\emptyset x + 37.779\emptyset y + 26.426\emptyset z$$

Super Cube:

$$Kxx(x,y,z) = 198.534\emptyset x^2 + 232.108\emptyset y^2 + 228.276\emptyset z^2 - 183.180\emptyset x\emptyset y - 186.927\emptyset x\emptyset z - 206.625\emptyset y\emptyset z + 50.697\emptyset x + 19.039\emptyset y + 25.532\emptyset z$$

$$Kyy(x,y,z) = 228.283\emptyset x^2 + 198.54\emptyset y^2 + 232.115\emptyset z^2 - 186.941\emptyset x\emptyset y - 206.639\emptyset x\emptyset z - 183.194\emptyset y\emptyset z + 25.534\emptyset x + 50.699\emptyset y + 19.041\emptyset z$$

$$Kzz(x,y,z) = 232.119 + 228.287\emptyset y^2 + 198.544\emptyset z^2 - 206.644\emptyset x\emptyset y - 183.199\emptyset x\emptyset z - 186.947\emptyset y\emptyset z + 19.041\emptyset x + 25.534\emptyset y + 50.699\emptyset z$$