

Appendix D

Regression formats used. The Y-intercept was assumed zero due to the comparatively low thermal resistance of air.

Linear:

$$K(x, y, z) = A\phi x + B\phi y + C\phi z$$

Linear Cross-Multiplied:

$$K(x, y, z) = A\phi x\phi y\phi z + B\phi x\phi y + C\phi x\phi z + D\phi y\phi z + E\phi x + F\phi y + G\phi z$$

Second-Order Quadratic:

$$K(x, y, z) = A\phi x^2 + B\phi y^2 + C\phi z^2$$

Quadratic:

$$K(x, y, z) = A\phi x^2 + B\phi y^2 + C\phi z^2 + D\phi x + E\phi y + F\phi z$$

Homogeneous Second-Order:

$$K(x, y, z) = A\phi x^2 + B\phi y^2 + C\phi z^2 + D\phi x\phi y + E\phi x\phi z + F\phi y\phi z$$

Second-Order Cross-Multiplied:

$$K(x, y, z) = A\phi x^2 + B\phi y^2 + C\phi z^2 + D\phi x\phi y + E\phi x\phi z + F\phi y\phi z + G\phi x + H\phi y + I\phi z$$

Third Order:

$$K(x, y, z) = A\phi x^3 + B\phi y^3 + C\phi z^3 + D\phi x^2 + E\phi y^2 + F\phi z^2 + G\phi x + H\phi y + I\phi z$$

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:

$$K_{xx}(x, y, z) = 77.287\phi x^2 + 36.415\phi y^2 + 36.360\phi z^2 + 28.374\phi x\phi y + 28.3424\phi x\phi z - 24.271\phi y\phi z + 28.345\phi x - 20.039\phi y - 19.98\phi z$$

$$K_{yy}(x, y, z) = 36.367\phi x^2 + 77.293\phi y^2 + 35.421\phi z^2 + 28.328\phi x\phi y - 24.285\phi x\phi z + 28.360\phi y\phi z - 19.977\phi x + 28.348\phi y - 20.036\phi z$$

$$K_{zz}(x, y, z) = 36.425\phi x^2 + 36.371\phi y^2 + 77.297\phi z^2 - 24.290\phi x\phi y + 28.354\phi x\phi z + 28.323\phi y\phi z - 20.036\phi x - 19.977\phi y + 28.348\phi z$$

Ultra Cube:

$$K_{xx}(x, y, z) = 232.045\phi x^2 + 176.688\phi y^2 + 176.715\phi z^2 - 205.445\phi x\phi y - 205.443\phi x\phi z - 120.530\phi y\phi z + 26.423\phi x + 37.803\phi y + 37.777\phi z$$

$$K_{yy}(x, y, z) = 176.721\phi x^2 + 232.051\phi y^2 + 176.694\phi z^2 - 205.458\phi x\phi y - 120.544\phi x\phi z - 205.460\phi y\phi z + 37.779\phi x + 26.426\phi y + 37.806\phi z$$

$$K_{zz}(x, y, z) = 176.698\phi x^2 + 176.725\phi y^2 + 232.055\phi z^2 - 120.549\phi x\phi y - 205.465\phi x\phi z - 205.463\phi y\phi z + 37.806\phi x + 37.779\phi y + 26.426\phi z$$

Super Cube:

$$K_{xx}(x, y, z) = 198.534\phi x^2 + 232.108\phi y^2 + 228.276\phi z^2 - 183.180\phi x\phi y - 186.927\phi x\phi z - 206.625\phi y\phi z + 50.697\phi x + 19.039\phi y + 25.532\phi z$$

$$K_{yy}(x, y, z) = 228.283\phi x^2 + 198.54\phi y^2 + 232.115\phi z^2 - 186.941\phi x\phi y - 206.639\phi x\phi z - 183.194\phi y\phi z + 25.534\phi x + 50.699\phi y + 19.041\phi z$$

$$K_{zz}(x, y, z) = 232.119 + 228.287\phi y^2 + 198.544\phi z^2 - 206.644\phi x\phi y - 183.199\phi x\phi z - 186.947\phi y\phi z + 19.041\phi x + 25.534\phi y + 50.699\phi z$$