1120-60-43 **John C Wierman*** (wierman@jhu.edu), Dept. of Applied Mathematics and Statistics, Johns Hopkins University, Baltimore, MD 21218. *Bounds for bond percolation thresholds of two three-dimensional lattices.* Preliminary report.

A percolation model is an infinite random graph model for phase transitions and critical phenomena. The percolation threshold corresponds to a phase transition point, such as a melting or freezing temperature. The exact value of the percolation threshold is not known for any three-dimensional percolation models, which are important for physical applications. Furthermore, rigorous bounds for the percolation thresholds of three-dimensional models are quite poor. We derive bounds for the bond percolation thresholds of two three dimensional lattices, the cubic lattice and a type of face-centered cubic lattice. We use the substitution method, which is based on stochastic ordering of probability measures on partition lattices. Upper bounds for the cubic lattice threshold are obtained by comparisons with two-dimensional subgraphs. Bounds for the cubic lattice are translated into bounds for the face-centered cubic. In addition, the approach provides a lower bound for the difference between the bond percolation thresholds of the two lattices, without knowing very accurate bounds for either individual lattice. A growth process approach in development may also be discussed. (Received January 31, 2016)