Analytic, Graphical, and Geometric Solutions for the Band Edges of One-Dimensional Photonic Band Gap Materials FRANK SZMULOWICZ[1], Air Force Research Laboratory — The conditions for the band gap edges of one-dimensional photonic band gap (PBG) materials are presented in alternate forms that lead to new analytic, graphical, and geometric solutions and interpretations. Heretofore unavailable analytical conditions for the band edges of quarter wave/half wave and eighth wave/half wave PBG structures are derived. The graphical solution has the form of an intersection of an invariant (material dependent) figure with a straight (structure dependent) line, a convenient separation not possible with the Kronig-Penney (KP) equation. The geometric solution is represented by the sides and angles of simple triangles. The present formalism should help in visualizing the PBG band gap formation beyond the view offered by the KP equation.

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