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Kenneth H Luther* (ken.luther@valpo.edu), Department of Mathematics and Computer Science, Valparaiso University, Valparaiso, IN 46383. *Double Layers, Solid Angles and Cubic Splines: Fun With a Well in a Stratified Aquifer*. Preliminary report.

In three dimensional groundwater flow which obeys Laplace's equation, the flux is obtained from the gradient of a scalar potential defined as $\Phi = k\phi$, where k is the hydraulic conductivity of the aquifer and ϕ is hydraulic head. When the only hydraulic feature in a model is a vertical well, flow to the well is radially symmetric. If the aquifer is stratified, k varies between otherwise homogeneous layers, and at an interface between two layers with different conductivities, the potential is discontinuous. Analytic solutions to flow to a vertical well in a stratified aquifer must create the required discontinuity at each interface; this can be done using double layers and their known potential functions. Here, annular double layers with strength distributions that vary as cubic polynomials are placed concentrically around a well to create a cubic spline fit to the required jump in potential. Resulting flow patterns can give insight into the capture zone of the well and contaminant transport to the well. (Received September 18, 2006)