Check 7 - Uniform flow in an unconfined aquifer with uniform recharge and two levels

Checks unconfined and confined domains, constant head line boundary, normal flux line boundary, spatially-variable area sinks for leakage, 3D pathlines traced across multiple levels

This is the same as check 4, but with two model layers: an unconfined aquifer over a confined one. The base of the unconfined domain is at 5 and the confined domain goes from 0 to 5 elevation. A spatially-variable area sink simulates vertical leakage between the two levels. At the left edge of the model, the unconfined domain discharge is about 0.78 and the confined domain discharge is about 0.16.

The recharge adds 0.50 as the pathline crosses the model from left to right, so the total discharge at the right side is 0.78 + 0.16 + 0.50 = 1.44 (0.80 in the upper + 0.64 in the lower at the right side).

The pathline that started at the top of the upper level at the left side stays in the in the upper domain and its fractional depth in level 1 at the right side of the model is 0.5/0.80 = 0.62, which puts it at about elevation 6.95 = 5 + (1.0-.62) * (10 – 5).

A second pathline starts at the left edge of the model in the middle of the upper level (elevation 17.5). At the left edge, 0.78/2 = 0.39 is the discharge above the pathline. When this pathline reaches the right edge of the model, there is 0.5 + 0.38 = 0.88 discharge above the pathline, which includes all of the upper level discharge (0.80) plus 0.08 in the lower level. The fractional depth of this pathline at the right side of the model is 0.08/0.64 =0.13 in the lower level level (elevation = 5 * (1.0 –.13) = 4.3).

Checking the extraction along a line from 0, 500 to 1000, 500 shows a good approximation of the spatially-variable distribution of vertical leakage in both levels.

Check7.anaq

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