AUTHOR'S REPLY by Philippe Renard

Centre for Hydrogeology, University of Neuchâtel, 11 Rue Emile Argand, CP 158, CH-2000 Neuchâtel, Switzerland; philippe.renard@unine.ch

I thank Dr. Yeh and his colleagues for pointing out an obvious mistake in Equations 12 and 15 of Renard (2005). They are right that the dimensionless radius $r_D$ was incorrectly left out of these equations. The correct equations (12) and (15), as indicated by Yeh et al., are

$$\bar{s}_{Du}(r_D,p) = \frac{K_0(r_D\sqrt{p})}{p\sqrt{p}K_1(\sqrt{p})} - \frac{K_0[(2l_D - r_D)\sqrt{p}]}{p\sqrt{p}K_1(\sqrt{p})} \quad (12)$$

$$\bar{s}_D(r_D,p) = \frac{K_0(r_D\sqrt{p}) - K_0[(2l_D - r_D)\sqrt{p}]}{p\{K_0[\sqrt{p}] - K_0[(2l_D - 1)\sqrt{p}]\}} \quad (15)$$

However, I would like to emphasize that the main point of Renard (2005) was to propose an approximate expression (Equation 18) for the discharge rate in the well during a constant head test in the presence of a recharge boundary. This equation was derived from the analysis of the closed-form analytical solution in the Laplace domain (Equation 13). These two equations are correct, and therefore the main results of Renard (2005) remain unchanged.

Another aspect of the comment of Yeh et al. (this issue) is that they develop and propose a new integral expression for the inverse Laplace transform of Equation 13. They calculate this integral with high accuracy by combining different numerical techniques. This is a valuable improvement that allows, for example, checking the accuracy of different numerical techniques. But I argue that in terms of practical application, the accuracy of the solution proposed by Renard (2005) is sufficient, considering all the other possible sources of errors such as the heterogeneity of the aquifer, potential noise in the data, uncertainty in the values of the effective parameters, or irregular shape of the constant head boundary when applying those analytical solutions to interpret field data or to make forecasts. The magnitude of the above-mentioned errors is certainly much higher than the maximum error (2%) due to the approximation made with Equation 18. Finally, a clear advantage of Equation 18 compared to Equation 5 of Yeh et al. is that it can easily be used in any spreadsheet without having to program a sophisticated algorithm.

**Editor's Note:** Comment received January 10, 2006, accepted March 8, 2006. Reply accepted August 14, 2007.