

EVALUATION OF THE ACCURACY OF A HYBRID STREAMLINE – SPH METHOD FOR SIMULATING REACTIVE TRANSPORT IN GROUNDWATER

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Summary. In this paper, we present a hybrid streamline based method that efficiently and accurately simulates reactive transport in porous media. The method treats advection in the same fashion as the well-known streamline methods, and dispersion using an approach inspired by smoothed particle hydrodynamics (SPH). We show that advection and dispersion are accurately simulated without spurious oscillations and with minimal numerical smearing even for high Péclet numbers. Unlike some particle methods, the approach is accurate where concentrations are low. In this paper, we use several benchmark reactive transport problems to examine the accuracy and efficiency of the new hybrid method and to assess the new method's performance in comparison to standard particle and mesh based methods. Examples show how smearing and oscillations in standard methods, which can be exacerbated by the nonlinear geochemical calculations associated with reactive transport, are much smaller with the new method for comparable or less computational cost.