Changes in adh4.7.1

New Features

SEDIMENT

- Updated the suspended sediment profile computation – SEDLIB has always utilized the nonequilibrium sediment profile developed in Brown (2008). Heretofore, the version utilized in the code was the simplified version that assumes a constant turbulence profile, and results in an exponential profile. This was done because the exponential profile can be depth-integrated analytically. However, the exponential profile is not as accurate as the solution that results from assuming a parabolic turbulence profile. Therefore, in AdHv4.7.1, SEDLIB has been updated to utilize the sediment profile derived from the parabolic turbulence profile. This means that adh4.7.1 will yield noticeably different sediment results than previous versions, and therefore projects that are verified with a previous version should be completed with that version.
- Each of the cohesionless suspended sediment entrainment functions are modified to assume a standard near-bed distance for the bottom of the concentration profile of 0.05h – This is done to ensure that each of these entrainment functions are consistent with the sediment profile, which is derived assuming a near-bed distance for the bottom of the concentration profile of 0.05h.
- Added the ability to turn sediment computations on and off – this provides significant added flexibility to the model. For example, the user can spin-up hydrodynamics before the sediment computations begin. It also extends the ability to utilize morphologic acceleration techniques. See the sediment manual for the SP NST card, and for instructions on morphologic acceleration.

Modifications to Existing Features

GENERAL

- The wetting and drying protocol has been altered. In AdH v4.7, an element was considered wet if any single node in the element had a depth > 0. Otherwise, it was dry. This ensured mass conservation, but also led to the potential for elements oscillating on and off, especially in very flat regions of the model domain. In AdH 4.7.1, this criteria is maintained for drying elements only. For wetting elements, the entire element must be 50% wet before the element reenters the computational domain (i.e. before the element contributes to the summation of the equations). Mass conservation is still assured, because whenever the element is below the 50% threshold, there is no contribution. This change creates an asymmetry in the wetting and drying protocols, and should make wet-dry interfaces more stable. It will also reduce (but not eliminate) the “bleed-through” phenomena associated with the wet-dry interface.
- Both the EEV and EVS cards have been modified. The EEV card inputs have been standardized, so that all methods have the same default coefficient and the same means of establishing a

minimum value. The EVS card has been simplified, so that only one value is required. Please consult the hydrodynamic manual for these changes.

WAVES

- For radiation stress computations, added the ability to read in the gradient of the radiation stresses from waves. Now, the user can either read in the stress tensor and compute the gradient vector in AdH (this is the existing default method), or the user can permit the gradients to be computed by the wave model outside of AdH, and just read in the resulting gradient vector (this is the new option).

SEDIMENT

- Reduced the minimum permissible grain roughness height from 1 mm to 3 times the diameter of Very Fine Sand (~0.25 mm)
- The upper bound of the undergrowth roughness factor for URV and EDO cards has been modified to permit a higher maximum roughness to depth ratio (the maximum was previously 1.0. Now it is 29.7)

Bug Fixes

GENERAL

- The spillway boundary coefficient was made dimensionless by multiplying by the square root of gravity. This makes the user default coefficient of 1.0 appropriate (1.0 is an ideal weir)
- Transport was corrected so that it functions properly for spillway boundaries (NB SPL)
- Fixed the “too many blocks for number of equations in node_order” error message that periodically stops the model when running multi-processor with adaption.
- Updated the SDK friction coefficient from Shen et al (1990) to Brown (2017).

SEDIMENT

- The SDV card (Sediment Diversion) has been removed from the code. It was found that it appeared to modify sediment fluxes (as intended), but in fact the fluxes were unchanged. So it was essentially doing nothing. As such, it has been removed from the code.