Chen’s note: 7/7/2016

**Horizontal random walk in a Lagrangian code**:

The *x* and *y* components of the horizontal random could be specified as

;

where is an independent, normally distributed random coefficient with zero mean and unit variance, and are the x and y components of the horizontal diffusion. could be specified in the range of [-0.5,0.5].

We could have two ways to determine and as follows.

Method 1: Directly output from the FVCOM physical model run. In this case,

= = *Ah*.

Method 2: Estimated by the Fickian’s formulation. Note: this method is only valid when a set of particles is released as a group at initial. In this calculation, the *x* (east-west) and *y* (south-north) components of the dispersion rate are defined as

where

and

Here *N* is the total number of particles released in each case and *i* is the index for individual particle.