SPH (cont')

The Kernel: W(r,h) smooths the particles over a finite volume. A fluid can then be represented by a finite number of particles.

An arbitrary function A(r) is defined:

$$A(r) = \sum_b A_b \, m_b/\rho_b \, W(r-r_b,h)$$

e.g. $\rho(r) = \sum_b m_b W(r-r_b,h)$

Defining ∇ Operator

Attempt 1: $\nabla A(r) = \sum_b A_b \, m_b/\rho_b \, \nabla W(r-r_b,h)$

Attempt 2: $\nabla A(r) = 1/\rho[\nabla(\rho A) - A\nabla\rho]$

$= 1/\rho(r) \sum_b [A_b-A(r)] \, m_b \, \nabla W(r-r_b,h)$

$$\nabla A_a = 1/\rho_a \sum_b [A_b-A_a] \, m_b \, \nabla W(r_a-r_b,h)$$