Central difference/upwind hybrid for non-uniform grids

Ultimately, we wish to write a formula to express

We are already familiar with the routine. We wish to write an formula for non-uniform grids

Following 3.12, we set

In the donor-cell term to discretize the mixed terms we have

Equation 3.1 describes the form of the hybrid scheme:

Therefore, we may the normal and mixed derivatives as

­­­The has already been developed. So let's look at the upwind only:

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and

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To represent this without if statements, we may write this as

Similar to the one dimensional case

We have