Central difference/upwind hybrid for non-uniform grids

# Donor-cell discretization

## Discretization in one dimension

For uniform grids, it is possible to write a hybrid scheme as

Where

,

,

To avoid these cases, we can also write this as

We can see that this simplifies to the

Or we may writ­e

Where

## Discretization in two dimensions

For the discretization of

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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Similar to the one dimensional case

We have