Modify our mykOmegaSST model into kOmegaSSTF

- Gyllenram, W. and Nilsson, H., *Design and Validation of a Scale-Adaptive Filtering Technique for LRN Turbulence Modeling of Unsteady Flow*, JFE, May 2008, Vol.130.
- Upper limit (Δ_f or `lt` below) to the modelled length scale (L_t or `Lt` below), applied to ν_t:

$$\Delta_f = \alpha \max\left\{\left|\vec{U}\right| \delta t, \Delta^{1/3}\right\}, \qquad \alpha = 3 \quad (\alpha > 1), \qquad \hat{\nu}_t = \left(\frac{\min(L_t, \Delta_f)}{L_t}\right)^{4/3} \frac{k}{\omega}$$

kOmegaSST:

```
// Re-calculate viscosity
nut_ = a1_*k_/max(a1_*omega_, F2()*sqrt(S2));
```

kOmegaSSTF: (implementation can be improved)

```
// Compute Filter
scalar alph = 3.0; //Should be in a dictionary
scalarField Lt = sqrt(k_)/(betaStar_*omega_);
scalarField lt = alph*Foam::max(Foam::pow(mesh_.V().field(), 1.0/3.0),
                 (mag(U_)*runTime_.deltaT())->internalField());

// Re-calculate viscosity
nut_.internalField() = Foam::min(Foam::pow(lt/Lt,4.0/3.0), 1.0)*
       (a1_*k_/max(a1_*omega_, F2()*sqrt(S2)))->internalField();
```

Modify our mykOmegaSST model into kOmegaSSTF

```
cd $WM_PROJECT_USER_DIR/src/turbulenceModels/incompressible/RAS/mykOmegaSST/
```

Find in `mykOmegaSST.C` the lines saying:

```
// Re-calculate viscosity
nut_ = a1_*k_/max(a1_*omega_, F2()*sqrt(S2));
```

Exchange those lines with:

```
// Compute Filter
scalar alph = 3.0; //Should be in a dictionary
scalarField Lt = sqrt(k_)/(betaStar_*omega_);
scalarField lt = alph*Foam::max(Foam::pow(mesh_.V().field(), 1.0/3.0),
                 (mag(U_)*runTime_.deltaT())->internalField());

// Re-calculate viscosity
nut_.internalField() = Foam::min(Foam::pow(lt/Lt,4.0/3.0), 1.0)*
       (a1_*k_/max(a1_*omega_, F2()*sqrt(S2)))->internalField();
```

Compile with `cd ..; wmake libso`

Modify the pitzDaily case for pimpleFoam

Make sure that you are in the `pitzDaily` case, and delete the previous results:

```
run ; cd pitzDaily ; rm -r [1-9]*
```

Modify the files in `system`, for use with `pimpleFoam`:

```
cp $FOAM_TUTORIALS/incompressible/pimpleFoam/TJunction/system/{fvSolution,fvSchemes} system

sed -i s/epsilon/omega/g system/fvSchemes
sed -i s/epsilon/omega/g system/fvSolution
sed -i s/simpleFoam/pimpleFoam/g system/controlDict
sed -i s/1000/0.3/g system/controlDict
sed -i s/"1;"/"0.0001;"/g system/controlDict
sed -i s/uncompressed/compressed/g system/controlDict
```

Add to `system/controlDict`:

```
adjustTimeStep no;
maxCo          5;
```

`pimpleFoam` needs one more dictionary:

```
cp $FOAM_TUTORIALS/incompressible/pimpleFoam/TJunction/constant/turbulenceProperties constant
```

We can re-use the same `0` directory that we modified before.
Make sure that you still specify `mykOmegaSST` in `constant/RASproperties`
Run the case with `pimpleFoam -noFunctionObjects` and make a nice movie of the results.

kOmegaSSTF

The `kOmegaSSTF` turbulence model is available for OpenFOAM-1.5 at OpenFOAM-extend:

`http://openfoam-extend.svn.sourceforge.net/viewvc/openfoam-extend/trunk/\`
`Breeder_1.5/OSIG/Turbulence/src/turbulenceModels/RAS/incompressible/kOmegaSSTF`

There is a `pitzDaily` tutorial for the `turbFoam` solver (no longer in OpenFOAM-1.6 and newer versions), and a utility for viewing the filter function.

It is also used in the Dellenback Abrupt Expansion case-study, which is described in the Turbulence Working Group Wiki:

`http://openfoamwiki.net/index.php/Sig_Turbulence_/_Dellenback_Abrupt_Expansion`