1. icoFoam

Boundary: frontAndBack

Field	type
U	empty
p	empty

Boundary: inlet

Field	type	value
U	fixedValue	uniform (10 0 0)
p	zeroGradient	

Boundary: outlet

Field	type	value
U	zeroGradient	
p	fixedValue	uniform 0

Boundary: sciany

Field	type	value
U	fixedValue	uniform (0 0 0)
p	zeroGradient	

Table of boundary conditions for t = 0

	frontAndBack	inlet	outlet	sciany
Patch Type	empty	patch	patch	wall
U	empty	fixedValue	zeroGradient	fixedValue
p	empty	zeroGradient	fixedValue	zeroGradient

Dimensions of fields for t = 0

Name	kg	m	s	K	mol	A	cd
U	0	1	-1	0	0	0	0
p	0	2	-2	0	0	0	0

Internal value of fields for t = 0

Name	Value
U	uniform (0 0 0)
p	uniform 0

Linear Solvers

Name	Solver	Abs. Tolerance	Relative Tol.
p	PCG	1e-06	0

```
U    smoothSolver 1e-05         0
==== =========== ============= =============
```

only nu setting are present in transportProperties dictionary
Selected schemat for finite volume discretization

Operator group	Equation element	Scheme
ddtSchemes		
	default	Euler
gradSchemes		
	default	Gauss linear
	grad(p)	Gauss linear
divSchemes		
	default	none
	div(phi,U)	Gauss linear
laplacianSchemes		
	default	Gauss linear orthogonal
interpolationSchemes		
	default	linear
snGradSchemes		
	default	orthogonal

keyword fluxRequired is set to

```
{
    default         no;
    p               ;
}

solvers
{
    p
    {
        solver          PCG;
        preconditioner  DIC;
        tolerance       1e-06;
        relTol          0;
    }

    U
    {
        solver          smoothSolver;
        smoother        symGaussSeidel;
        tolerance       1e-05;
        relTol          0;
    }
}

PISO
{
    nCorrectors     2;
    nNonOrthogonalCorrectors 0;
    pRefCell        0;
    pRefValue       0;
}
```

2. pisoFoam

In this section we will show how to change case files to use pisoFoam instead od icoFoam

File	Change	Notes
transportProperties	transportModel Newtonian;	
constant/turbulenceProperties	simulationType laminar;	
system/fvSchemes	div((nuEff*dev(T(grad(U))))) Gauss linear;	in divschemes section
system/solvers	pFinal	

By the way, for solving p field, the GAMG solver is much better than Gauss-Sidel or PCG.

```
pFinal
{
\$p;
tolerance 1e-06;
relTol 0;
}
```

2.1. pisoFoam with turbulence on

This section explains, how to set up simulation with $k-\varepsilon$ turbulence model on.

File	Change	Notes
constant/turbulenceProperties	simulationType RASModel	
constant/RASProperties	RASModel kEpsilon; tubrulence on; printCoeffs on;	new file
0/k	look into tutorial files	new boundary condition file
0/epsilon	look into tutorial files	new boundary condition file
system/fvSchemes	div(phi,epsilon)	in div section
system/fvSchemes	div(phi,k)	in div section
fvSolutions	k and epsilon	ie. "(U—k—epsilon)" instead of just U

Conduct research on flow image for backward facing step using inlet velocity $u_x = 50[m/s]$ time step $\Delta t = 1e-4$.