

## ABSTRACT

**PROBLEM:** How to solve another continuum and momentum equation in FLUENT?

**DESCRIPTION:** This deals with some new turbulent model. In this model, two momentum equations and two continuum equation has to solve. There are pressure gradient in every momentum. All the equation writes as follow (steady flow):

$$\text{Divergence}(U_{\text{average}})=0 \quad (1)$$

$$\text{Convection}(U_{\text{average}}) = \text{Diffusion}(U_{\text{average}}) + \text{Gradient}(P_{\text{average}}) + \text{Source} \quad (2)$$

$$\text{Divergence}(U_{\text{flucture}})=0 \quad (3)$$

$$\text{Convection}(U_{\text{flucture}}) = \text{Diffusion}(U_{\text{flucture}}) + \text{Gradient}(P_{\text{flucture}}) + \text{Source} \quad (4)$$

$$\text{Other algebraic equations} \quad (5)$$

$$\text{Where: } U = U_{\text{average}} + U_{\text{flucture}} \quad P = P_{\text{average}} + P_{\text{flucture}}$$

There are eight different equations and eight variables ( $U_{\text{average}}$ ,  $V_{\text{average}}$ ,  $W_{\text{average}}$ ,  $P_{\text{average}}$ ,  $U_{\text{flucture}}$ ,  $V_{\text{flucture}}$ ,  $W_{\text{flucture}}$ ,  $P_{\text{flucture}}$ ) for 3D. For FLUENT, the first pressure, i.e.  $P_{\text{average}}$  can be coupled with velocity through SIMPLE algorithm or by using couple solve. With UDS equation supplied by FLUENT, It can be solved by three component of  $U_{\text{flucture}}$  by view every component as scalar. But the  $P_{\text{flucture}}$  can't be solved through an independent scalar equation. The solve process of FLUENT can't be modified, so the  $P_{\text{flucture}}$  can't be revised through continuum equation or be solve simulate with other equation. One method is that take divergence for equation (4), then we can get a Poisson equation about  $P_{\text{flucture}}$ . Many related items appears in equation (4) will be removed owing to the continuum limitation (eqn.3). Then  $P_{\text{flucture}}$  can be regarded as an independent variable (scalar), the origin four difference equations ( $U_{\text{flucture}}$ ,  $V_{\text{flucture}}$ ,  $W_{\text{flucture}}$ ,  $P_{\text{flucture}}$ ) will become four scalar equations which FLUENT can solve. But in the new equation, source will be more complex. And it is not clear exactly whether there are other problems with this solve process.