Lampiran 1 Panduan Simulasi Numerik Bunsen Burner

Langkah-langkah dalam pemodelan simulasi numerik bunsen burner:

1. Membuka Ansys Workbench dan jalankan analisys system Fluent pada Project Schematic. Selanjutnya membuat geometri bunsen burner sesuai dengan dimensi yang telah ditentukan.



Membuat Surface Sketch untuk membuat bangun 2D pada wall.

2. Selanjutnya melakukan proses meshing



Selanjutnya pada pengaturan mesh, pilih *relevance center*: *fine* dan *smoothing*: *high*. Agar hasil *meshing* lebih halus dan teratur dan ukuran maksimal dari *mesh* diatur bernilai 0,1 mm

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Setelah melakukan proses *meshing*, lalu memberi penamaan daerah pada geometri: *inlet*, *outlet*, *wall*, dinding, *unburn zone*, dan *burn zone*.

3. Membuka menu *Setup* pada *Fluent* dan mengatur pemodelan

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Mengatur pemodelan persamaan energi. Klik *Model* > *Energy* > Centang *Energy Equation*

4. Mengatur pemodelan turbulensi. Klik *Model* > Viscous > Pilih k-epsilon > Ok



5. Memodelkan reaksi kimiawi pembakaran menggunakan Species Transport. Klik Species > Pilih Species Transport > Centang Volumetric > Pilih Eddy-Dissipation > Pilih Mixture Material menjadi Methane-Air > Klik Apply

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6. Selanjutnya mengganti properti dari *mixture material methane-air*. Klik dua kali *methane-air* pada menu *materials*, lalu atur *density* menjadi *ideal-gas*.

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Mesh Generation	Create/Edit Materials					×	:		
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7. Selanjutnya mengatur nilai *boundary conditions*. Pertama yaitu mengatur kecepatan masuk reaktan pada *inlet* dengan cara, klik *Inlet* > *Edit* > Masukkan Nilai *Inlet Velocity* 00,239 m/s; 0,358 m/s; 0,477 m/s; 0,597 m/s; 0,716 m/s; 0,835 m/s; 0,954 m/s; 1,074 m/s; dan 1,193 m/s. Nilai-nilai tersebut diperoleh berdasarkan perhitungan konversi dari persamaan debit bahan bakar dan udara yang masuk menuju *inlet* berdasarkan variasi kecepatan reaktan, untuk perhitungan selengkapnya dapat dilihat pada lampiran 2.

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8. Selanjutnya, masih pada *boundary condition* pada *inlet*, kita atur nilai *species* yang akan ditransportkan dengan Klik *Species* > Klik *Specify Species In Mole Fractions*. Lalu isi kolom *mole fractions* sesuai perhitungan fraksi mol pada kondisi pembakaran stoikiometri dengan bahan bakar metana.

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9. Selanjutnya menuju Monitors untuk mengatur parameter-parameter yang diinginkan agar saat melakukan perhitungan parameter tersebut dapat konvergen. Pilih Monitors > Pilih Volume Monitors > Create > Field Variable Pilih Pressure > Pilih Cell Zones yang akan diamati Burn > Klik Ok. Lalu ulangi langkah sebelumnya untuk memonitor temperatur, dengan mengganti Field Variable menjadi Temperature. Lalu selanjutnya Klik Convergence Manager > Lalu Centang Semua Volume Monitors yang telah dibuat.

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 Selanjutnya pilih Solution Initialization. Pilih Standard Initialization > Pilih Compute From: All-Zones > Kemudian Klik Initialize. Setelah melakukan Solution Initialization, selanjutnya masuk ke menu Run Calculation > Masukkan Iterasi yang akan digunakan. > Klik Calculate. Pastikan perhitungan berlangsung hingga konvergen.

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11. Terakhir yaitu proses pembacaan hasil (*Plot Result*). Setelah melakukan *Run Calculation*, lalu kembali ke menu *Project Schematic*, dan klik *Results*.



Untuk menampilkan data hasil perhitungan, Klik *Contour* > Pilih Daerah yang Ingin Diamati > Lalu Pilih *Variable* yang Ingin Diamati > Klik *Apply*