Pi-D Calculation

Pi-D

$$egin{aligned} \Pi_{ij} &= P_{ij} - p\delta_{ij}; \quad p = (p_{xx} + p_{yy} + p_{zz})/3; \quad heta &=
abla \cdot u \end{aligned}$$
 $egin{aligned} \Pi &= egin{pmatrix} p_{xx} - p & p_{xy} & p_{xz} \\ p_{yx} & p_{yy} - p & p_{yz} \\ p_{zx} & p_{zy} & p_{zz} - p \end{pmatrix} \end{aligned}$
 $D_{ij} &= rac{1}{2}(\partial_i u_j + \partial_j u_i) - rac{ heta}{3}\delta_{ij}$
 $D &= egin{bmatrix} \partial_x u_x - rac{ heta}{3} & rac{1}{2}(\partial_x u_y + \partial_y u_x) & rac{1}{2}\partial_x u_z \\ rac{1}{2}(\partial_y u_x + \partial_x u_y) & \partial_y u_y - rac{ heta}{3} & rac{1}{2}\partial_y u_z \\ rac{1}{2}\partial_x u_z & rac{1}{2}\partial_y u_z & -rac{ heta}{3} \end{aligned}$

$$egin{aligned} \Pi_{ij}D_{ij} &= \Pi_{xx}D_{xx} + \Pi_{yy}D_{yy} + \Pi_{zz}D_{zz} + \Pi_{xy}D_{xy} + \Pi_{yx}D_{yx} + \Pi_{xz}D_{xz} + \Pi_{zx}D_{zx} + \Pi_{yz}D_{yz} + \Pi_{zy}D_{zy} \ \\ \Pi_{ij}D_{ij} &= \Pi_{xx}D_{xx} + \Pi_{yy}D_{yy} + \Pi_{zz}D_{zz} + 2(\Pi_{xy}D_{xy} + \Pi_{xz}D_{xz} + \Pi_{yz}D_{yz}) \end{aligned}$$

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