1. $$\frac{\tilde{d}\rho_a}{dt} = \sum_{b \in A \cup B} \frac{m_b}{\rho_b} \left(\rho_a \, \tilde{\mathbf{u}}_{ab} \; + \; (\rho \, (\tilde{\mathbf{u}} \; - \; \mathbf{u}))_{ab}\right) \cdot \nabla_a W_{ab}$$

2. $$\frac{\tilde{d}\mathbf{u}_a}{dt} = - \sum_{b \in A \cup B} m_b \left[\left(\frac{p_a}{\rho_a^2} + \frac{p_b}{\rho_b^2} \right) \mathbf{I} - \left(\frac{\boldsymbol{\sigma}_a^{'}}{\rho_a^2} + \frac{\boldsymbol{\sigma}_b^{'}}{\rho_b^2} + \Pi_{ab} \mathbf{I} \right) \right] \cdot \nabla_a W_{ab} + \mathbf{g}_a$$

3. $$\nabla \mathbf{u}_a = - \sum_{b \in A \cup B} \frac{m_b}{\rho_b} (\mathbf{u}_a - \mathbf{u}_b) \otimes (\nabla_a W_{ab})$$