Component	Equation	Description
Continuity equation	$$\frac{\partial\rho}{\partial t}+\nabla(\rho\vec{v})=0$$ where ρ= water density, $\boldsymbol{v}$ = velocity vector, ∇=gradient operator	Account for the flux of mass going into a defined area and the flux of mass leaving the defined area
The momentum equations	$$\frac{\partial\vec{v}}{\partial t}=\vec{g}-\frac{1}{\rho}\nabla p+\nu\nabla^2\vec{v}-2\vec{\Omega}\times\vec{v}+\vec{F}$$ where g=gravitational force, p=water pressure, ∇^2= Laplacian operator, Ω=angular velocity of the earth, F=external forces, ν=kinematic viscosity	Navier–Stokes equation, valid for incompressible Newtonian flows
The advection equation	$$J_a=C\vec{v}$$ where J_a=advective flux density, C=pollutant concentration	Provide information for the horizontal transport by flows of pollutants; this is a primary transport process in the longitudinal direction in the rivers and estuaries
The dispersion equation	$$J=-D\frac{dC}{dx}$$ where J=dispersive mass flux density, D=diffusion coefficient, x=the distance	Provide information for the horizontal spreading by reducing the gradient of material concentration
Tidal equation	$$\eta(t)=a_0+\sum_{k=1}^{N}\left[a_k\cos\left(\frac{2\pi}{T_k}t\right)+b_k\sin\left(\frac{2\pi}{T_k}t\right)\right]+\eta_0(t)$$ where η(t)= tidal elevation, t= time, a0=mean value of η(t), a_k and b_k=constant, T_k= the tidal period of k_{th} tidal constituent, N=number of tidal constituents, $\eta_0(t)$= residual signal other than the periodic components	Provide information of water level over the tidal cycle in the tidal estuaries