Component	Equation	Description
Continuity equation	$$\frac{\partial \rho}{\partial t} + \nabla(\rho \vec{v}) = 0$$ where ρ= water density, 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, η_0(t)= residual signal other than the periodic components	Provide information of water level over the tidal cycle in the tidal estuaries