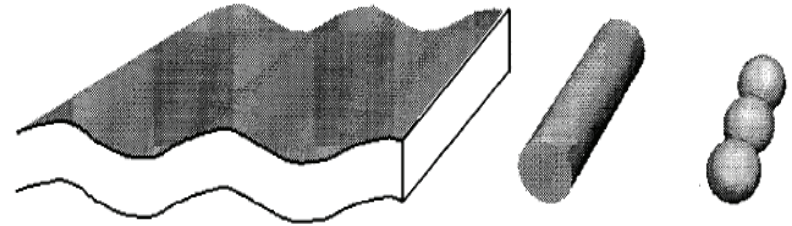


# Mechanistic Modeling

## Atomization process

### Droplet formation mechanism



1 - Film Formation - The liquid is ejected as a thin sheet due to the centrifugal motion within the nozzle

$$U = K_v \sqrt{\frac{2\Delta P}{\rho_L}}$$

2 - Instability Sheet Analysis (LISA) - Aerodynamic instabilities cause the film to break up into ligaments related to the maximum growth rate

$$\omega^2 (\tanh(kh) + Q) + (4vk^2 \tanh(kh) + 2iQkU) + 4vk^4 \tanh(kh) - 4v^2 k^3 \tanh(lh) - QU^2 k^2 + \frac{\sigma k^3}{\rho} = 0$$

3 - Droplet formation - Weber's result for capillary pinching of a viscous cylinder

$$K_L d_L = \left[ \frac{1}{2} + \frac{3\mu}{2(\rho_L \sigma d_D)} \right]$$