

ORNL Advanced Volume Tracking Methods Are Simple, Computationally Efficient, and Can Handle Easily Any Topological Change of the Interface

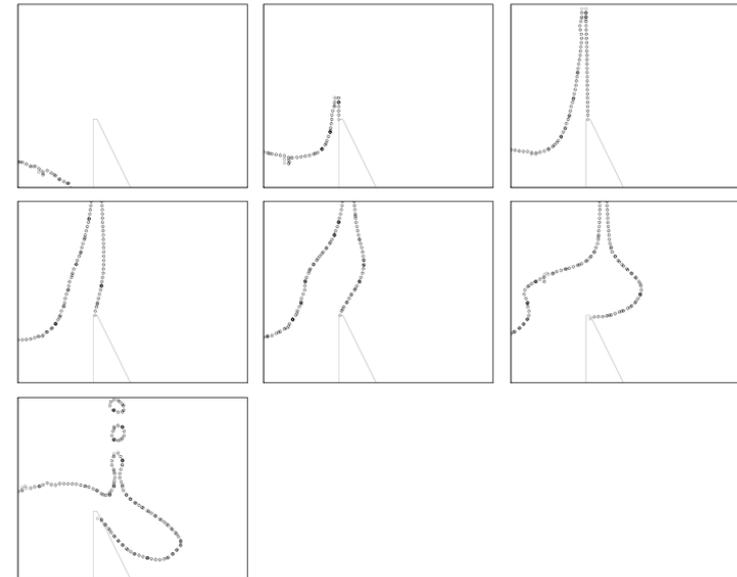
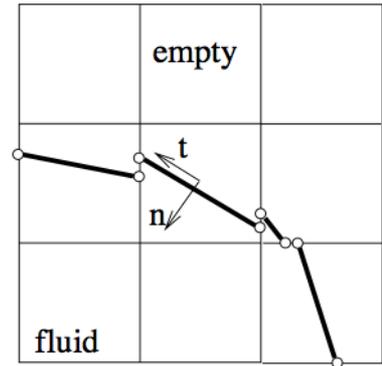
- Sharp interfaces are represented by a set of polygons fitted within each surface cell.
- The Volume of Fluid (VOF) function is simply advected by the local flow:

$$\frac{\partial F}{\partial t} + (\mathbf{V} \cdot \nabla)F = 0$$

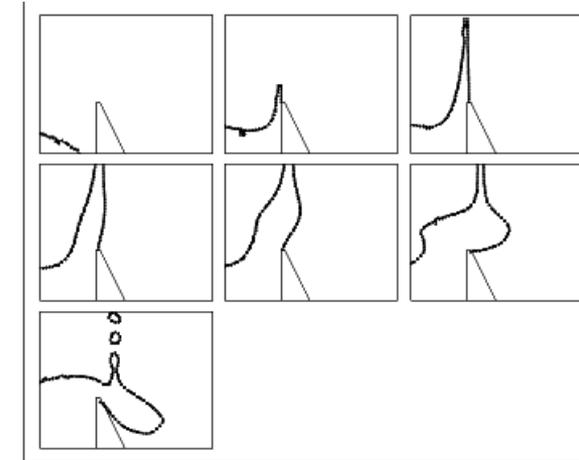
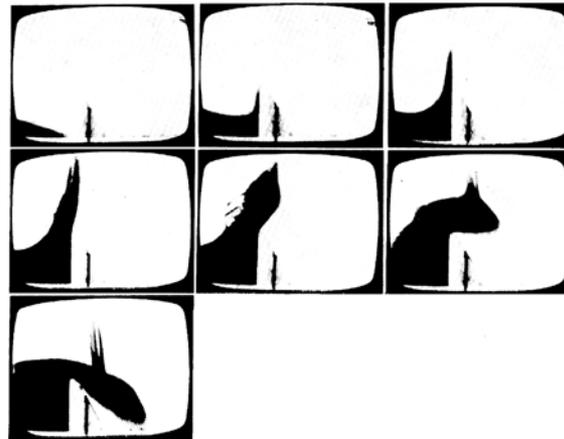
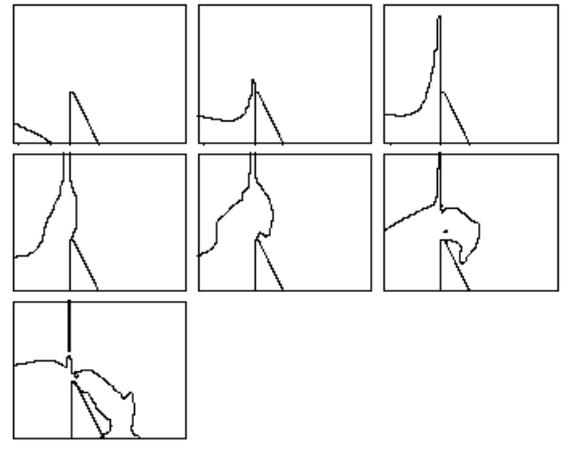
- Advection of interfaces is computed very efficiently based on mass balance:

$$F^n = F^o (1 + \delta t \nabla \cdot \mathbf{V}) + \sum_{\text{faces}} \delta V_f^o / V_c$$

- VOF methods can handle with ease interfaces that break apart and merge together.



2D VOF methods were validated for flow over a dike; VOF models can be used to simulate microstructure evolution



**Poor visual agreement.
Spillage error 31%
(RIPPLE).**

**Experimental results
(Greenspan and Young, 1978)**

**Very good visual agreement.
Spillage error 5%
(Sabau and Raad; 1995, 1999)**

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break apart and merge.**