EXPRESSIVE + WICED 2025

Expressive Rendering for 2D Animations of Liquids

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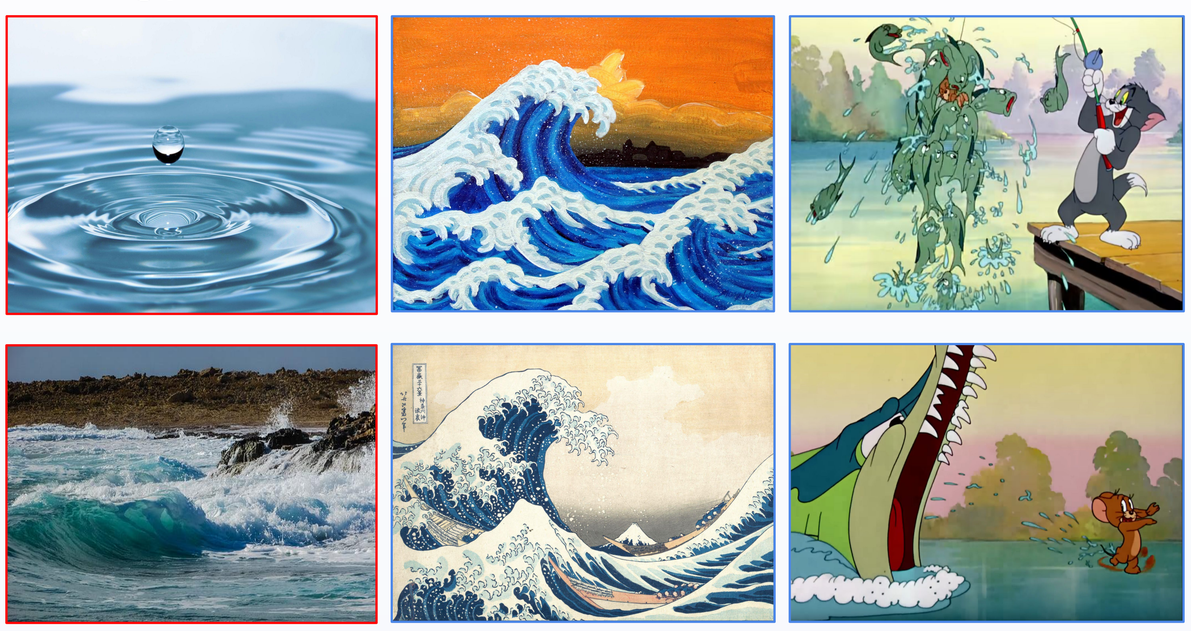
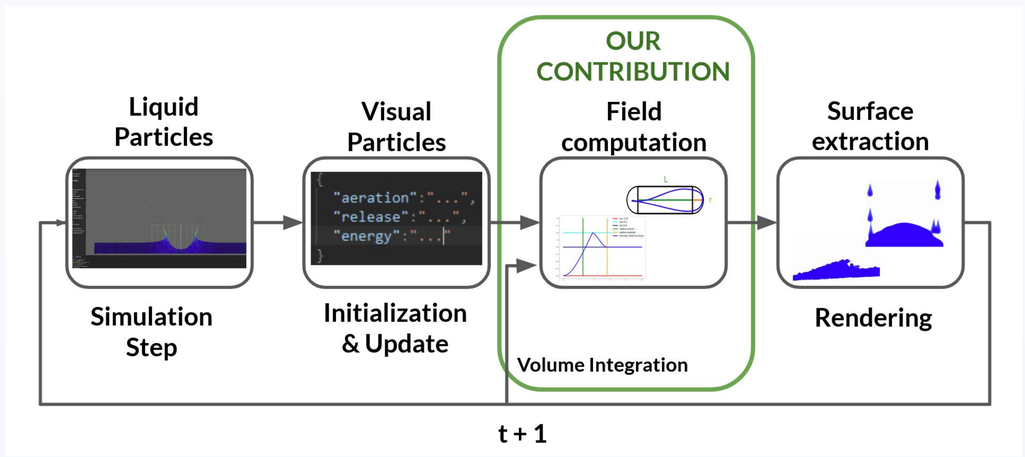
OVERVIEW

Our new expressive rendering technique for 2D animation of liquid surfaces is based on a hybrid visual particle model that carries both Water and Air density distributions, which can evolve through particle history. These two material quantities, combined with kinematic information, are then used to generate a scalar field. The latter is parameterized so that the implicit iso-surface captures the type of stylized geometry commonly seen in paintings and cartoons. The method is ready to use on any existing particle-based simulation.



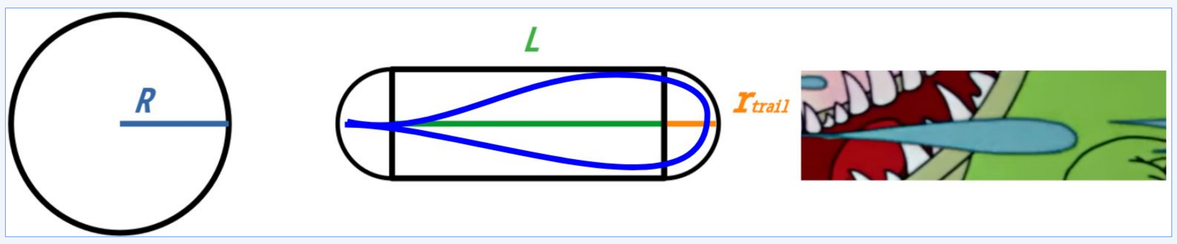
PIPELINE



- **Minimal information required to generate the effects**

EXPRESSIVE DROPLETS

1) TAIL COMPUTATION



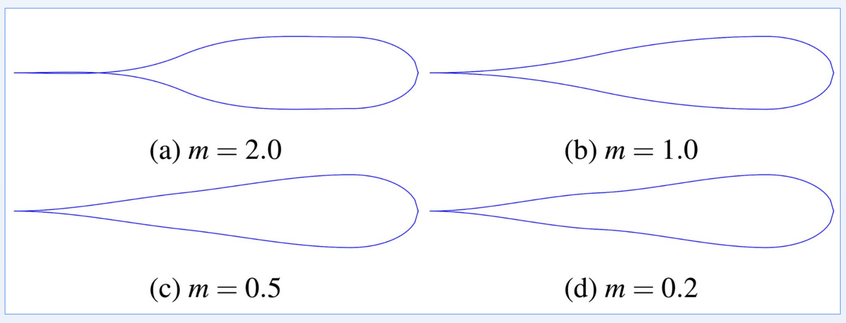
- **Droplet contained in original area.**

$$\pi R^2 = \pi r_{trail}^2 + 2 r_{trail} L$$

$$r_{trail} \leq R$$

- **Skeleton defined by trayectory.**
- **Direct relationship with speed.**

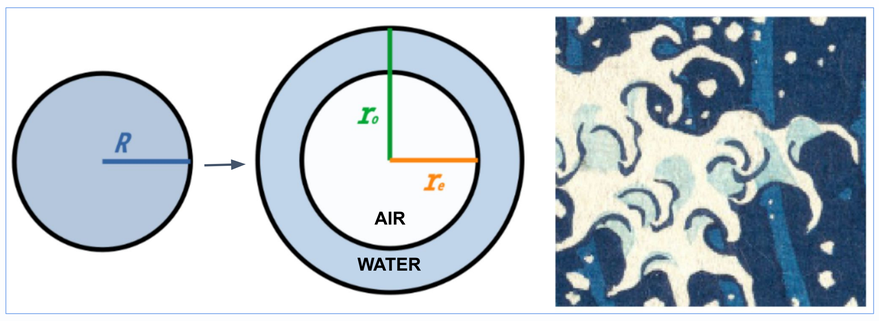
2) VARIATION OF STYLES



- **Skeletal radius variation defined by a spline.**
- **Ideal values of m in [0.2, 1.2].**

CONCAVE EFFECTS

1) CONCAVE SHAPE



- **Air contained within the particle.**

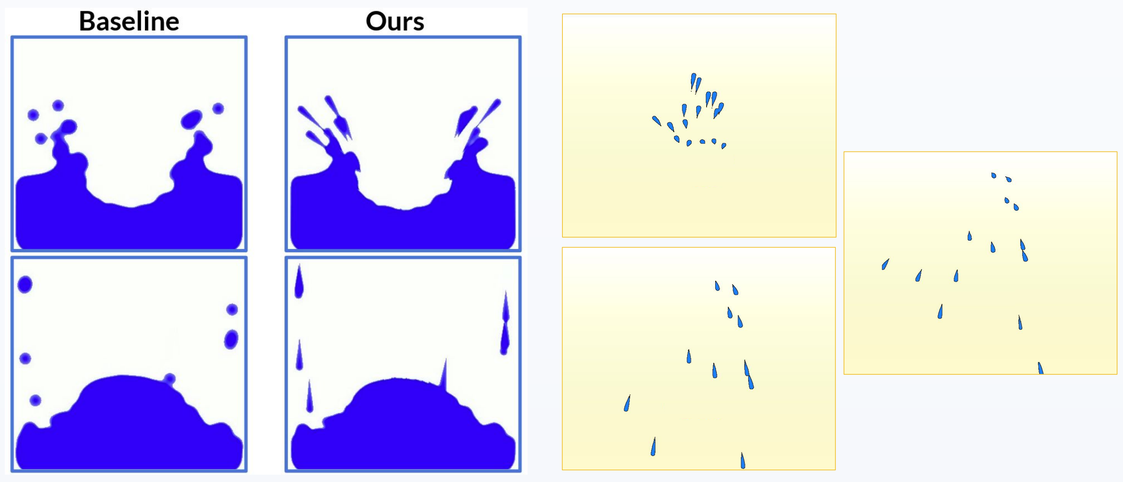
$$\pi R^2 = \pi r_o^2 - \pi r_e^2$$

$$(R^2 + r_e^2) = r_o^2$$

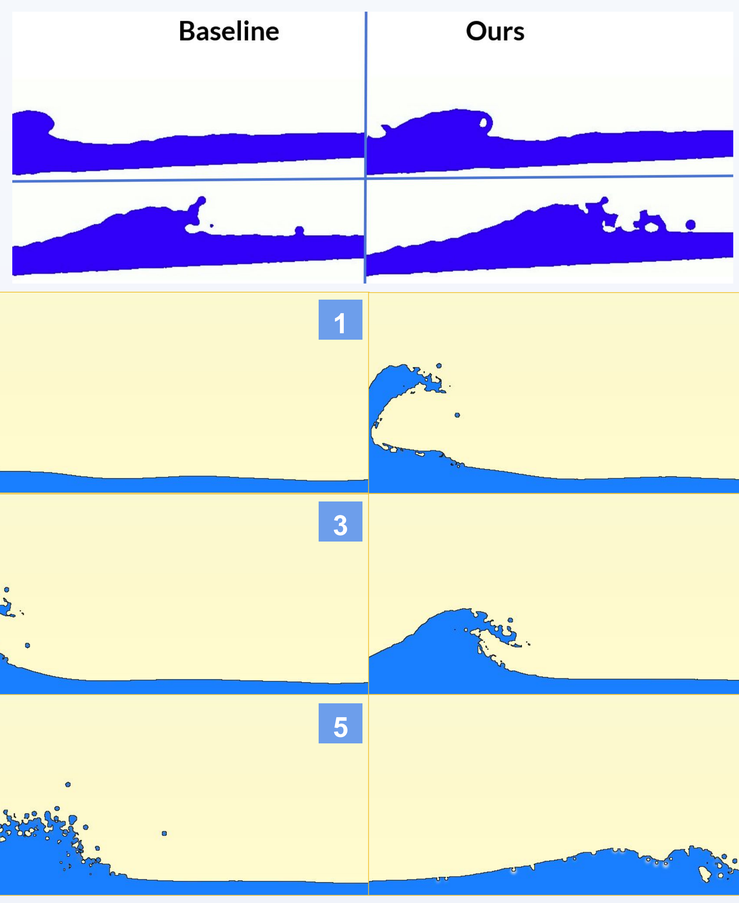
- **Air used to "erase" fields for the target effect.**

RESULTS

1) SPLASH



2) WAVES



CONCLUSIONS AND FUTURE WORK

- **Non-photorealistic method for rendering liquid animations**
- **Initial results show some interesting shapes aligned with our goals.**
- **Improve detection and disable undesired effects.**
- **Extension to 3D.**

ACKNOWLEDGEMENTS

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We would like to thank to the authors of the tool SPlisHSPlash[1], used for the particle simulation.

[1]Bender, J., & Others. (n.d.). *SPlisHSPlasH Library*.