Applicability of thermal particle tracer for monitoring very shallow overland flow velocities

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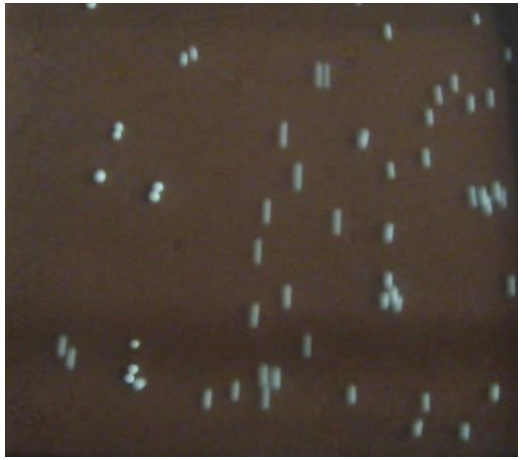
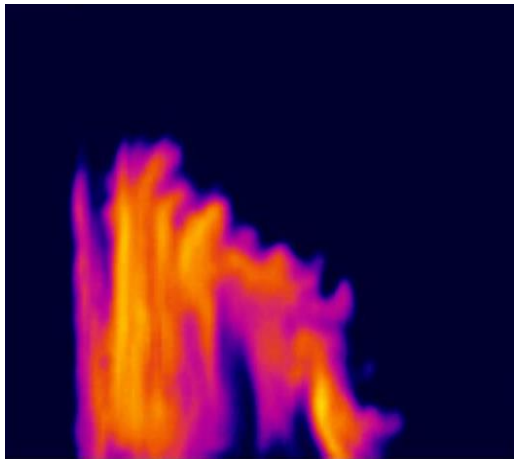
Velocity measuring techniques for flows depths of few millimeters

Dye Tracing

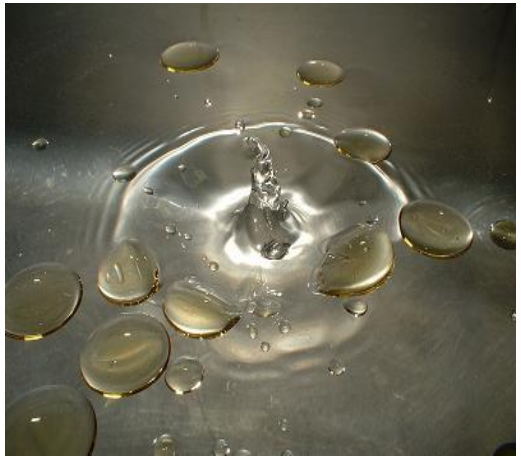


PTV technique

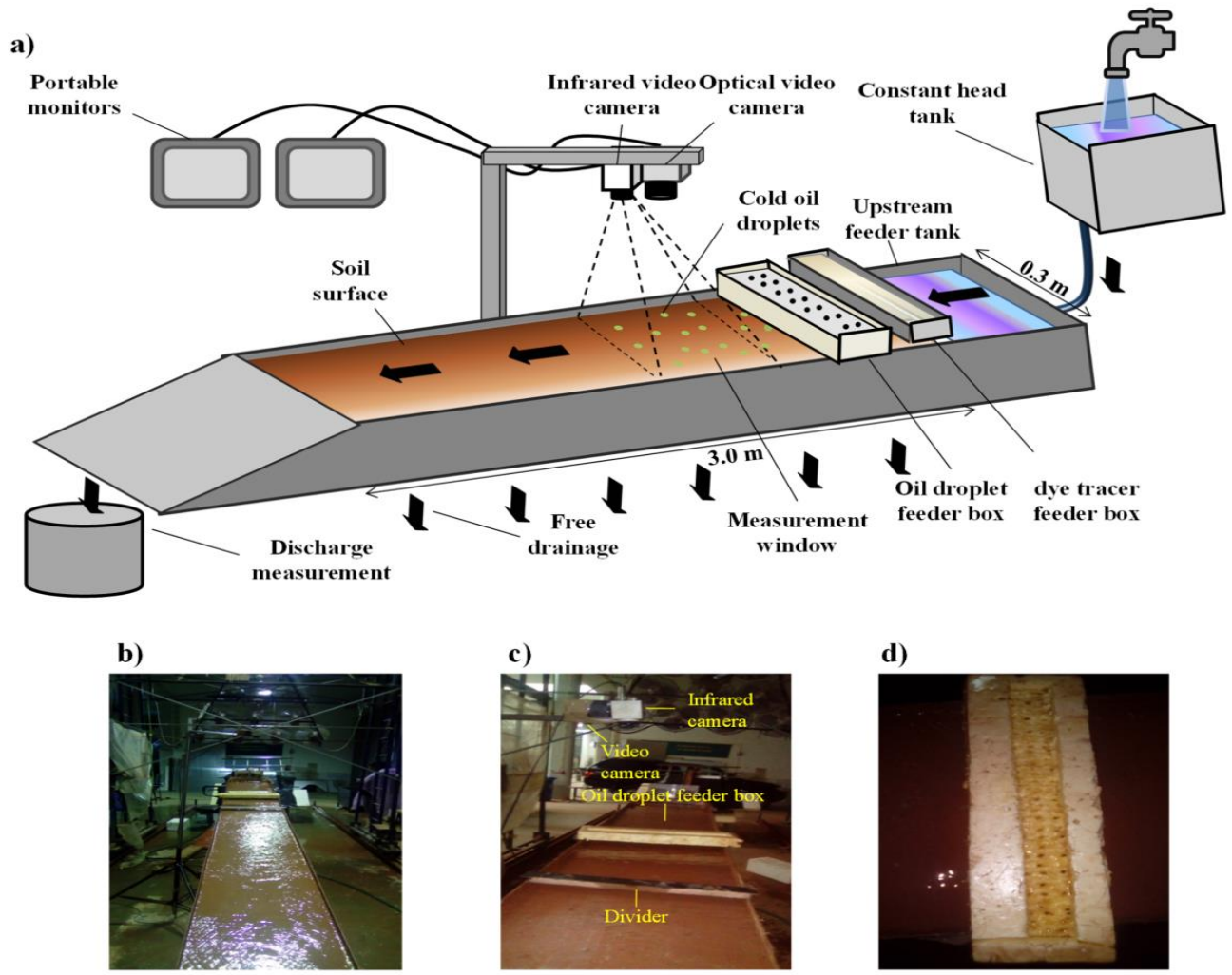


Thermal tracing

New thermal particle tracer-Cold oil droplets



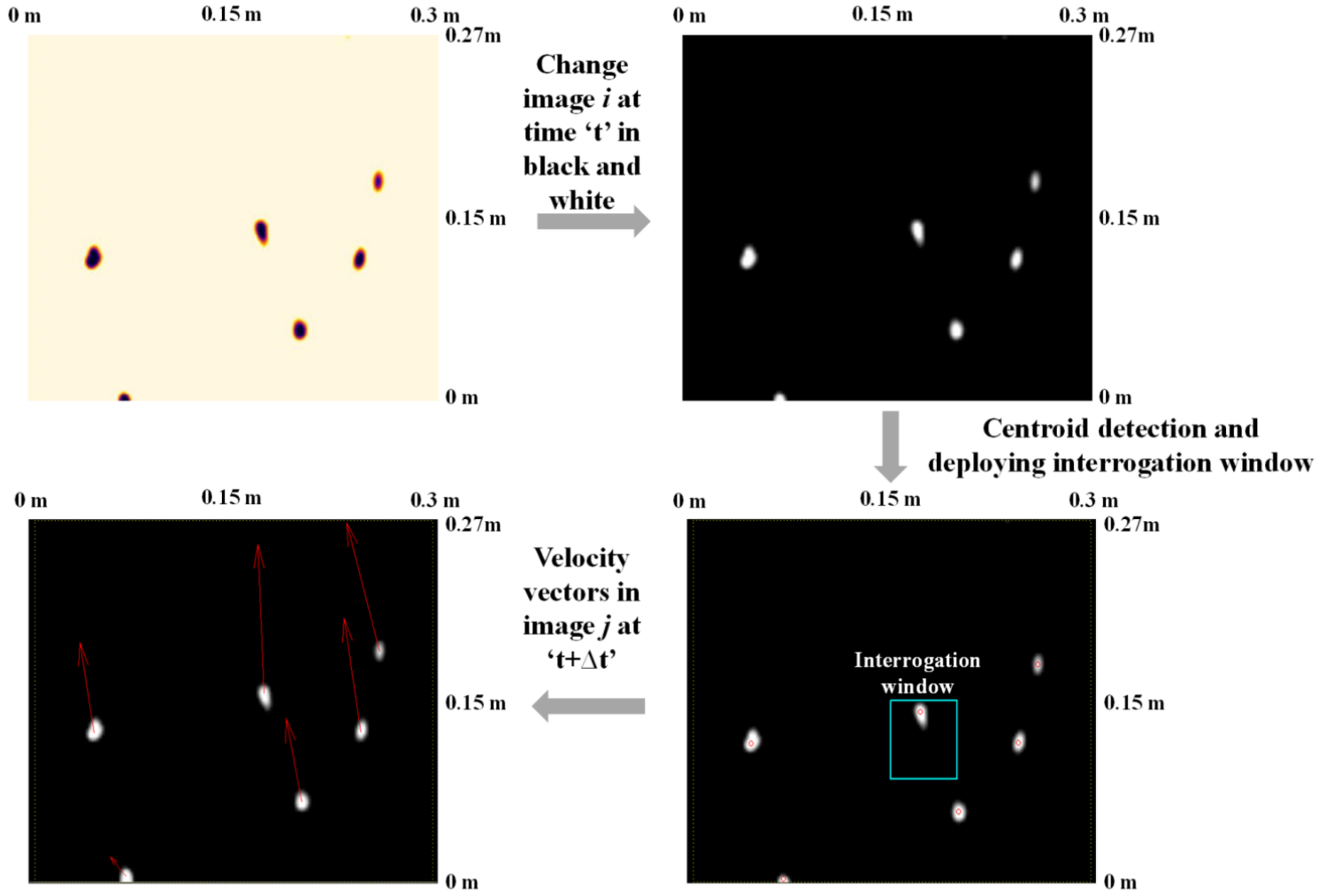
Methodology



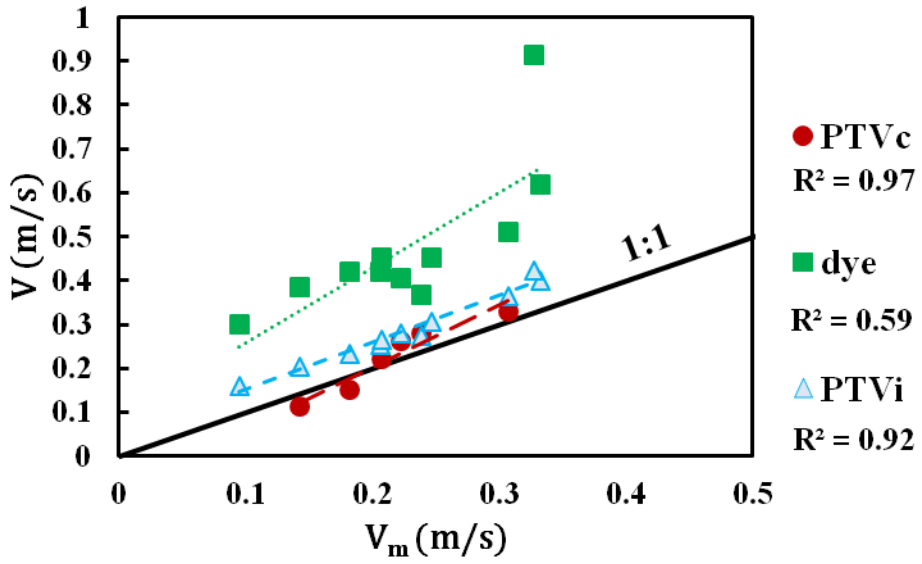
- Eleven experiments
- 45-153 ml/s discharge
- 5,7,10 and 15% slope
- 0.3 × 0.27 m Interrogation window size
- < 2mm flow depth
- Four velocity measuring techniques

1. Thermal imaging based PTV technique (PTVi)
2. Dye tracing
3. Volumetric discharge method
4. Conventional PTV technique (PTVc)

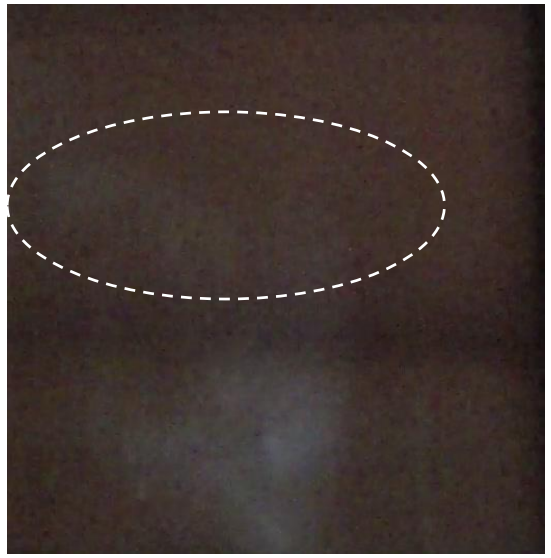
Fundamental concept of thermal imaging based PTV technique (PTVi)



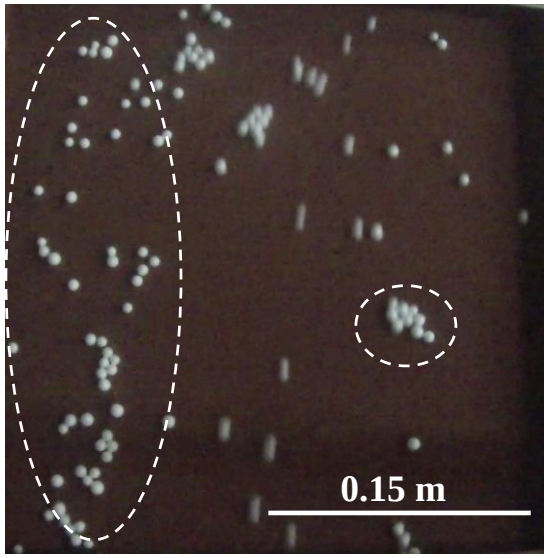
Results and Discussion



Dye tracing



PTVc technique



For very shallow flows, PTVi technique can be an alternative to optical methods which are dependent on good illumination conditions, tracer's visibility and tracking.