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Spatial distribution modeling of droplets during water dropwise condensation on textured surfaces

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SIMULATION ALGORITHM

- 1500 initial random points with size of $1\mu\text{m}$
- Droplets growth at each time step by diffusion and coalescence
- $r_{\text{new}} = [(r_{\text{old}})^2 + G]^{1/2}$, $G = 4.15 \frac{K\Delta T}{H\rho}$
- K = water thermal conductivity, H = heat of condensation and ρ = water density
- Nucleation of new bubbles in each step

RESULT

- Model validation using Ripley function (It basically evaluates the mean number of drops within a specific distance from each drop center)
- Good agreement between model and experimental results
- Deviation from Poisson process because of coalescence

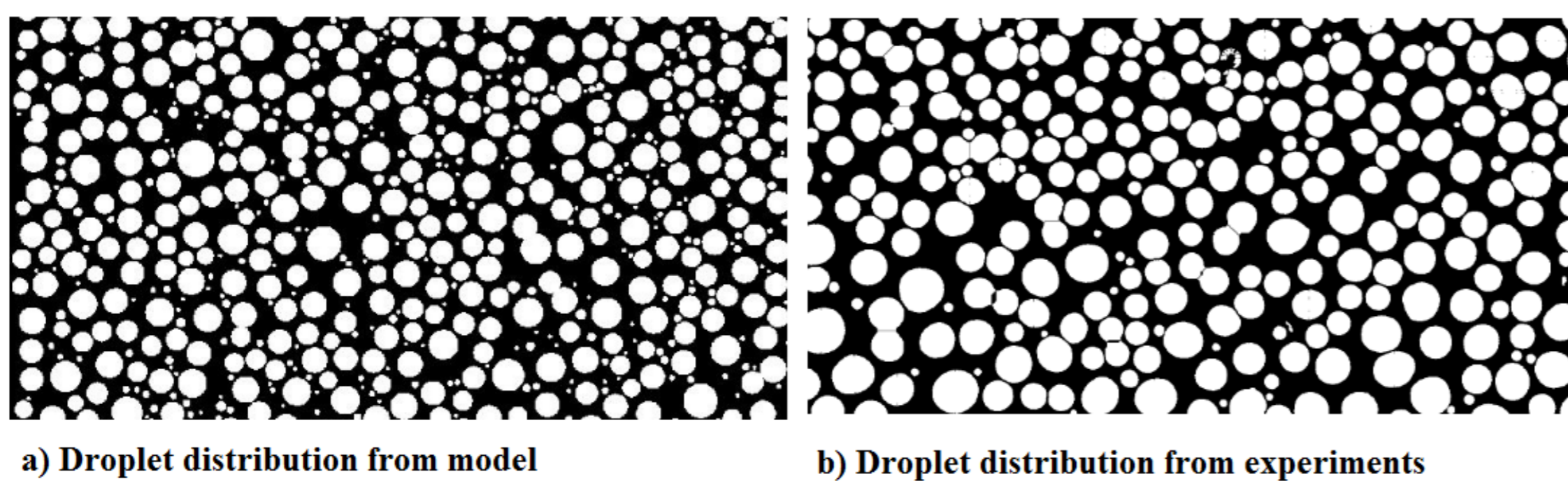


Figure 1: Results of model and experiment for Droplets distribution on a flat surface.

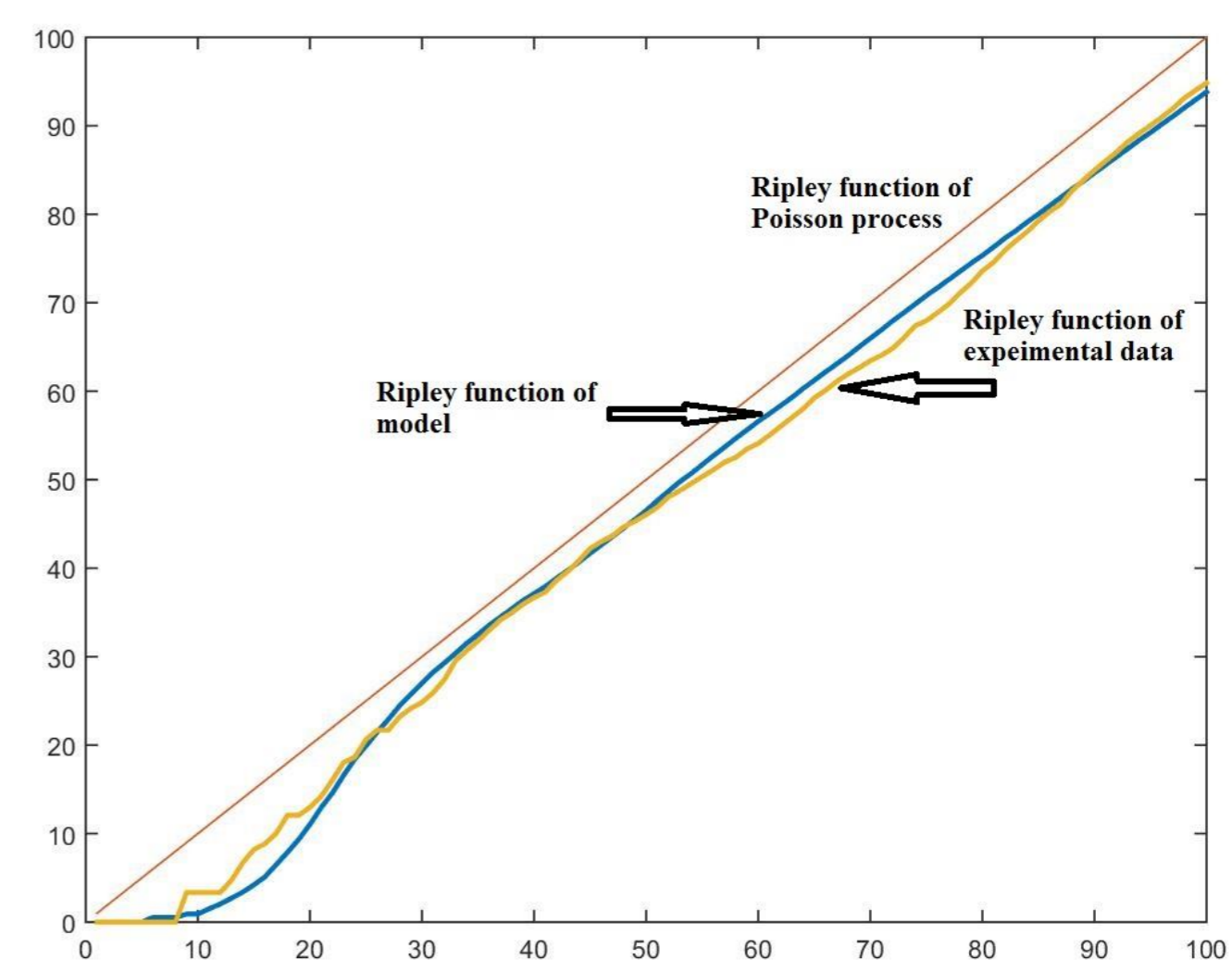


Figure 2: Ripley function of results of model and experimental data.

PERSPECTIVE

- Investigation the effect of surface topography on droplets nucleation
- Size and shape analysis
- Other point process: Hard core process