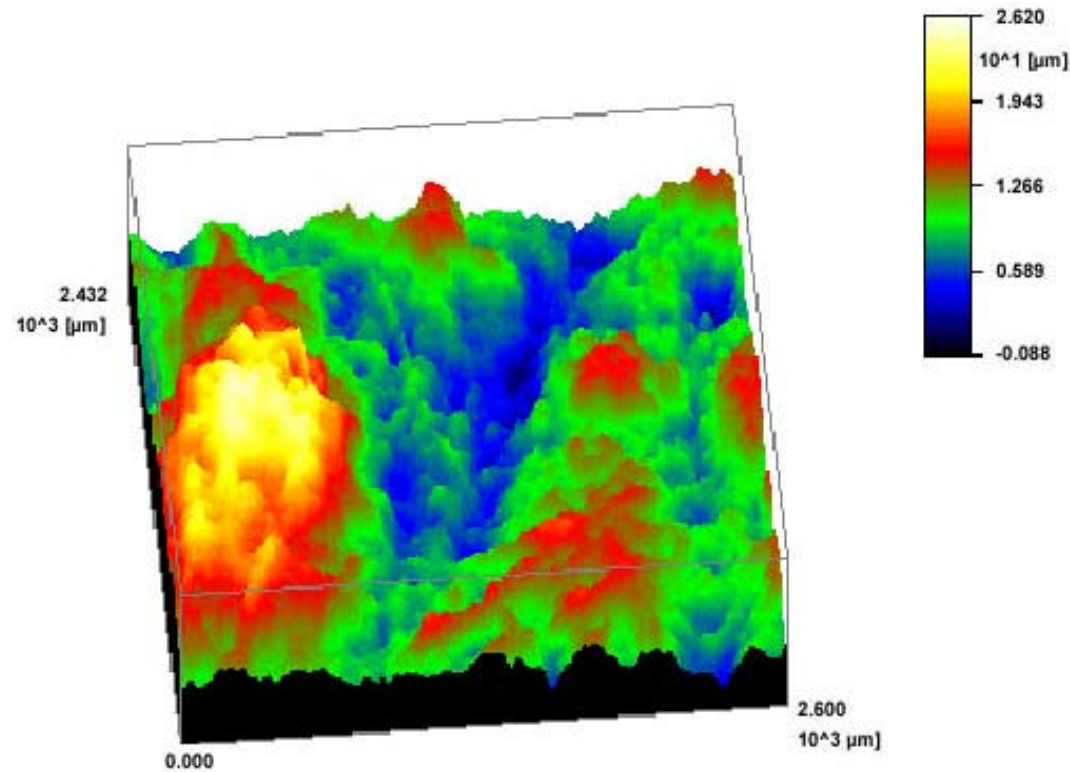


**Surface Structure Characterization of Porous Materials
using X-ray Micro Computed Tomography**

3D Profile of Paper Surface



As paper is a macroscopically homogeneous surface, the characterization is not always straightforward under the microscope.

Surface Properties Characterization

For surface properties characterization, relevant parameters may include flatness, relative inclination of surfaces, porosity, roughness frictional properties.

Possible characteristics: thickness distribution, surface volume distribution, contact fraction and surface pit distribution

Surface Volume



Contact Fraction (%)



Surface Pit Distribution



Surface Properties Characterization

Thickness distribution

non-uniformity of sample thickness

Surface volume distribution

non-uniformity of sample surface height

Contact fraction

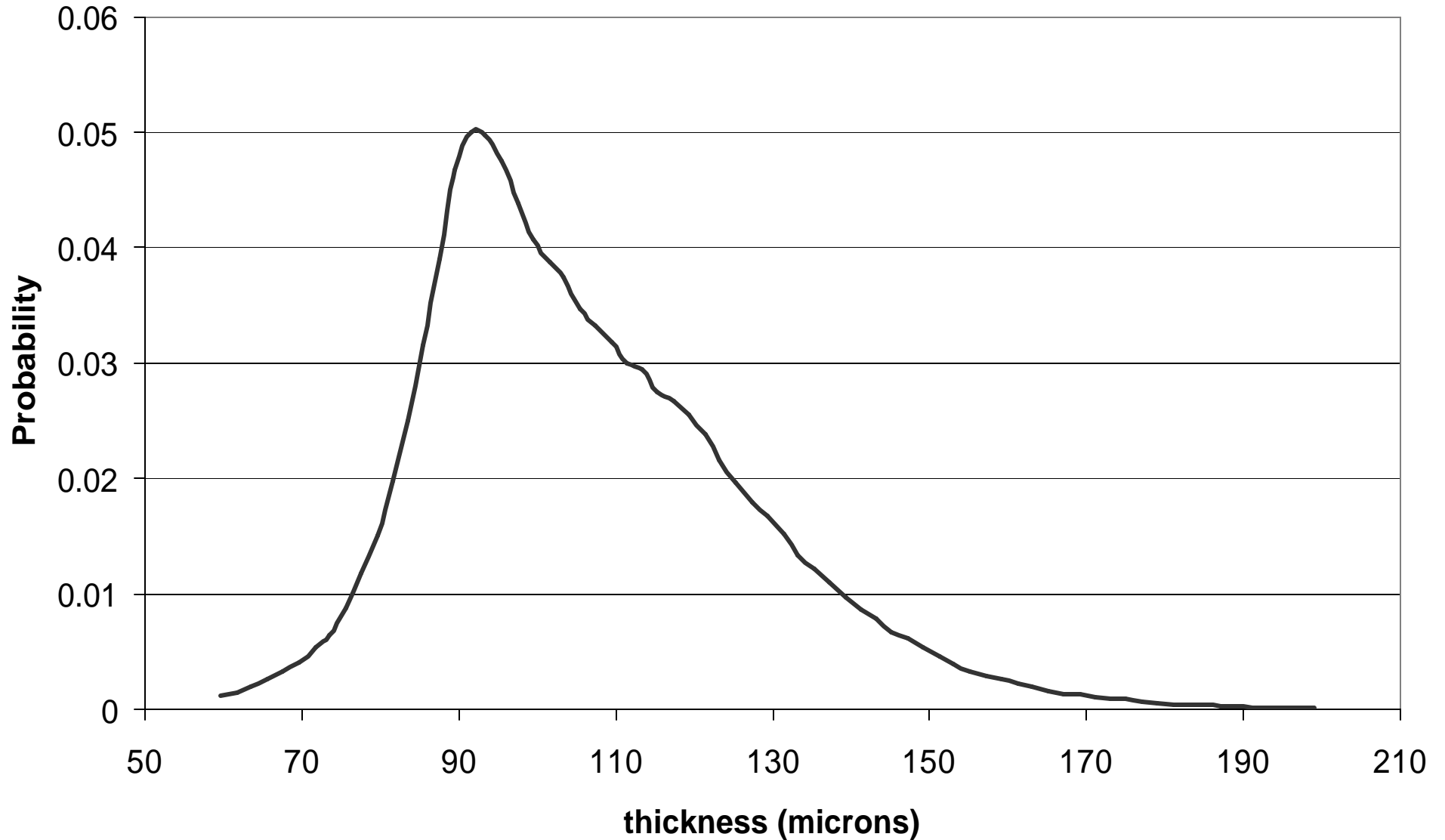
2D porosity

Surface Pit Distribution

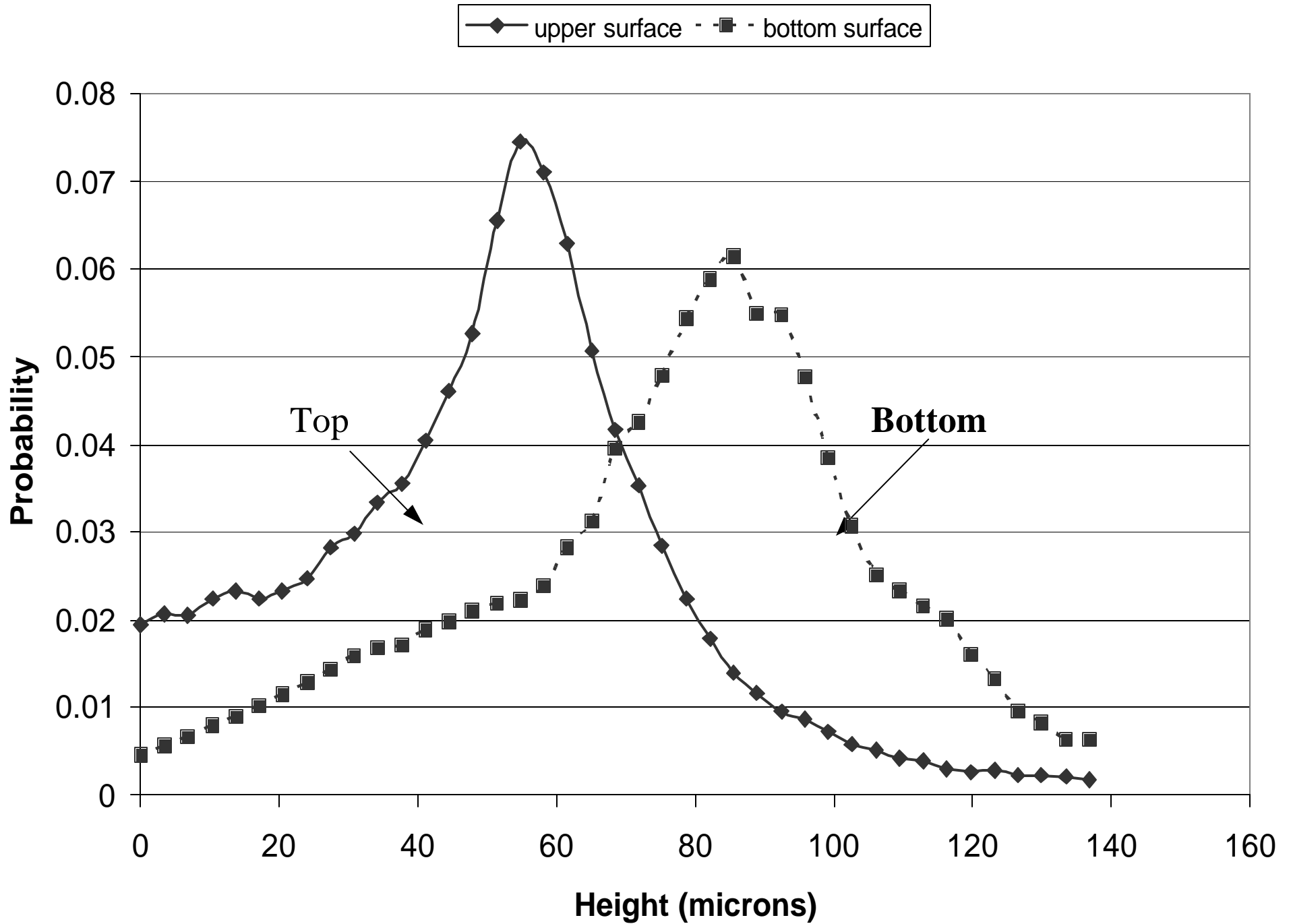
non-uniformity of the width between two peaks on a specified surface level.

Thickness Distribution

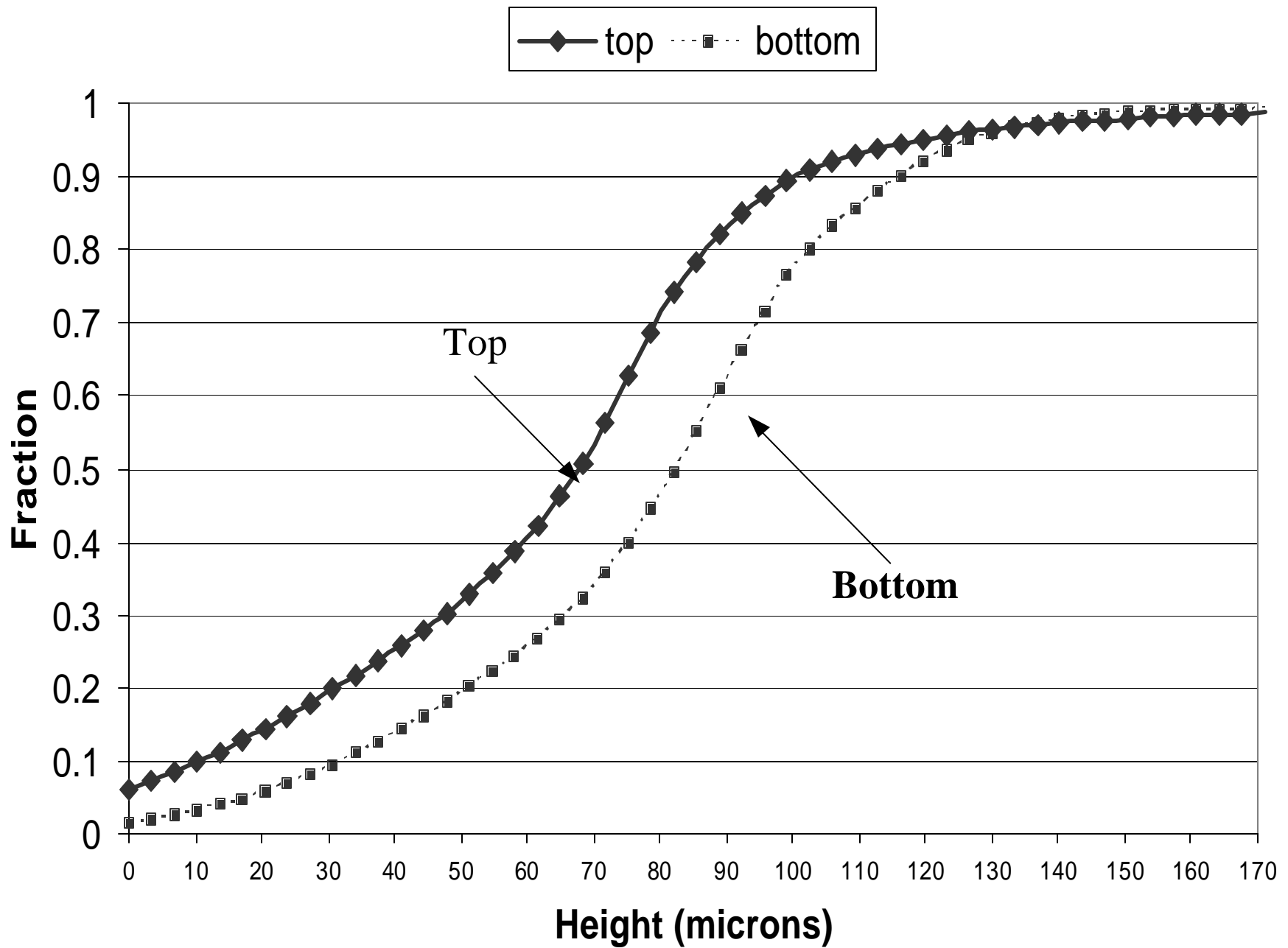
(300 gsm (pilot m/c) bleached kraft board sample)



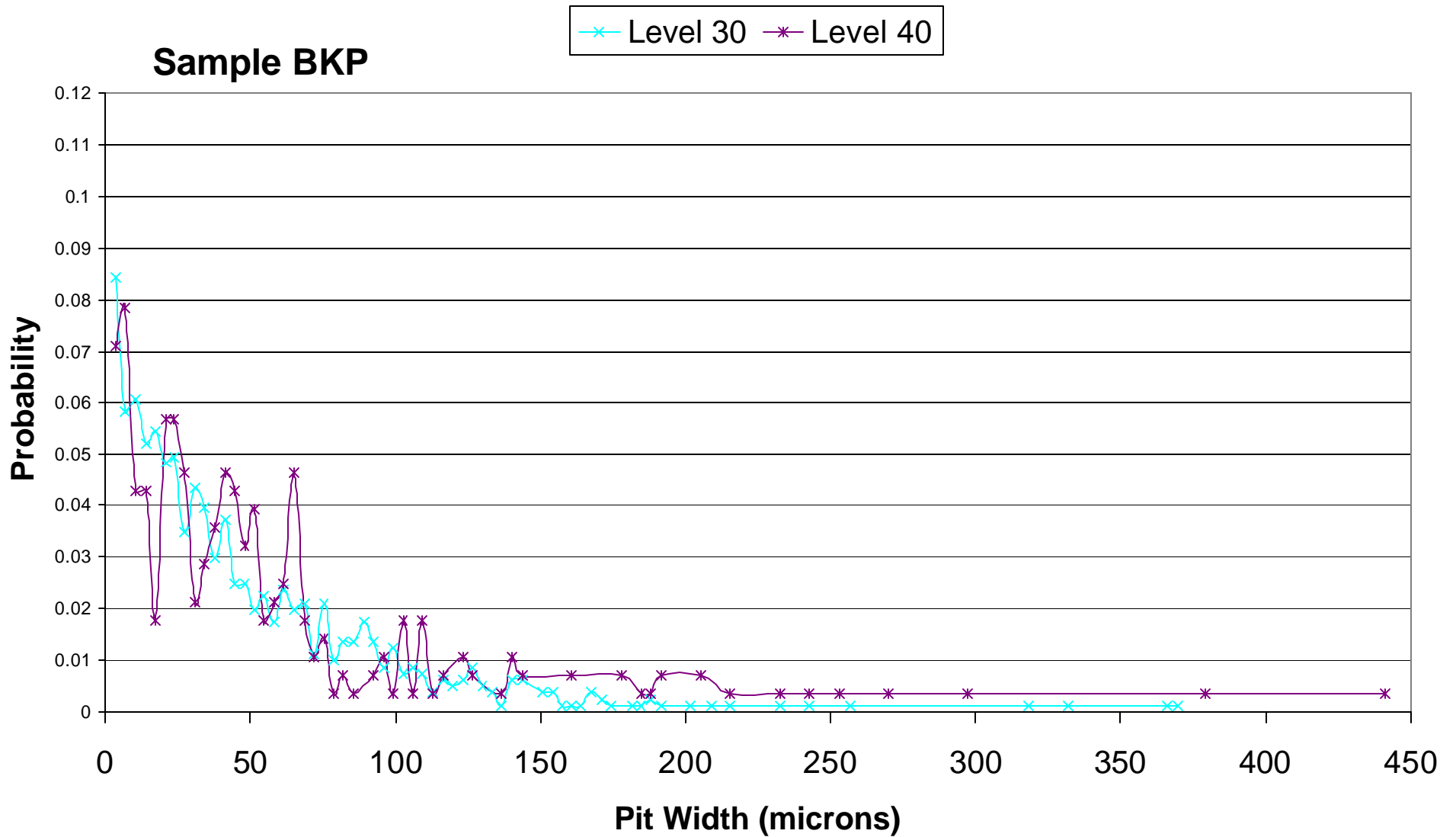
Surface Volume Distribution

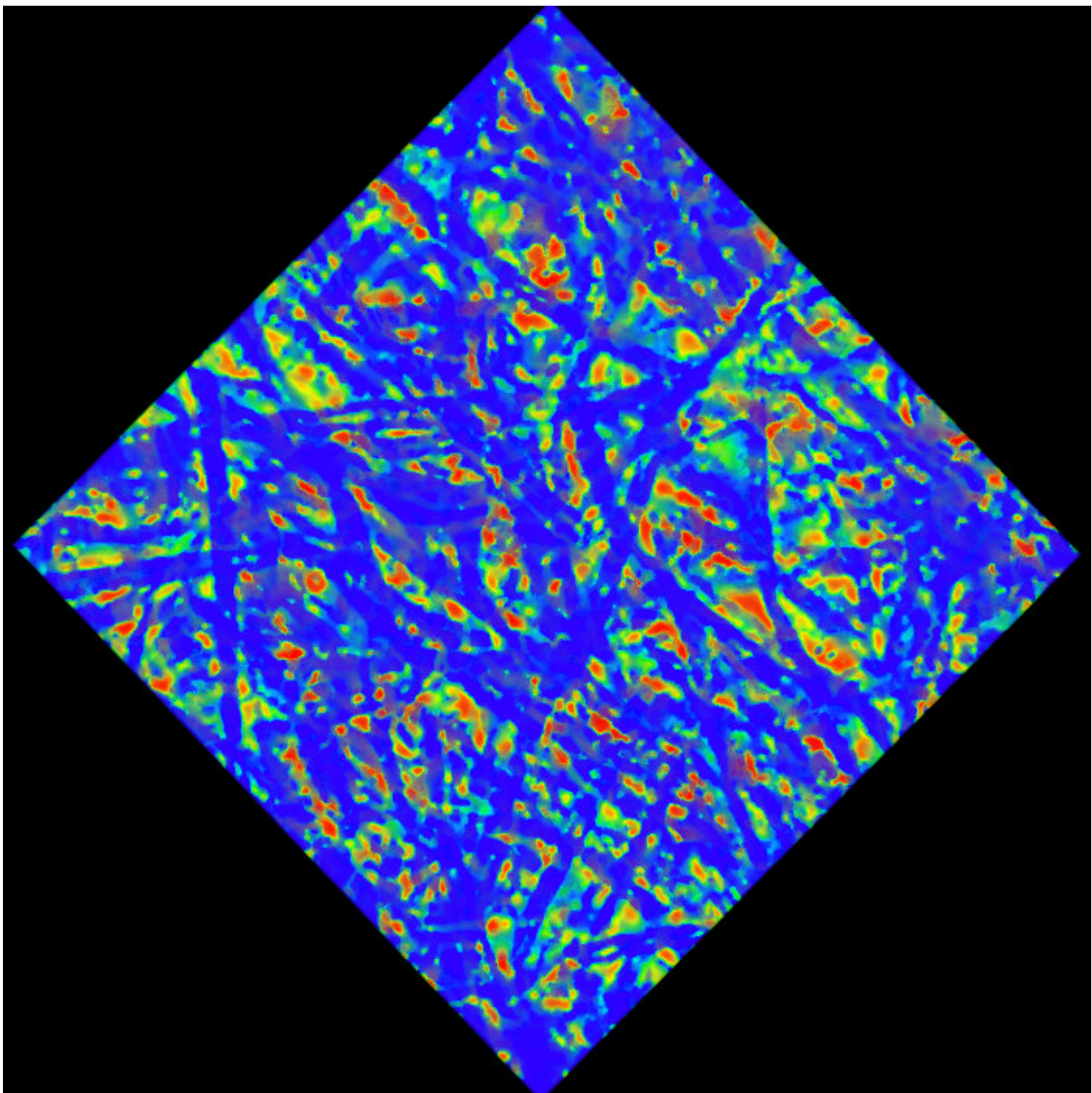


Contact Fraction

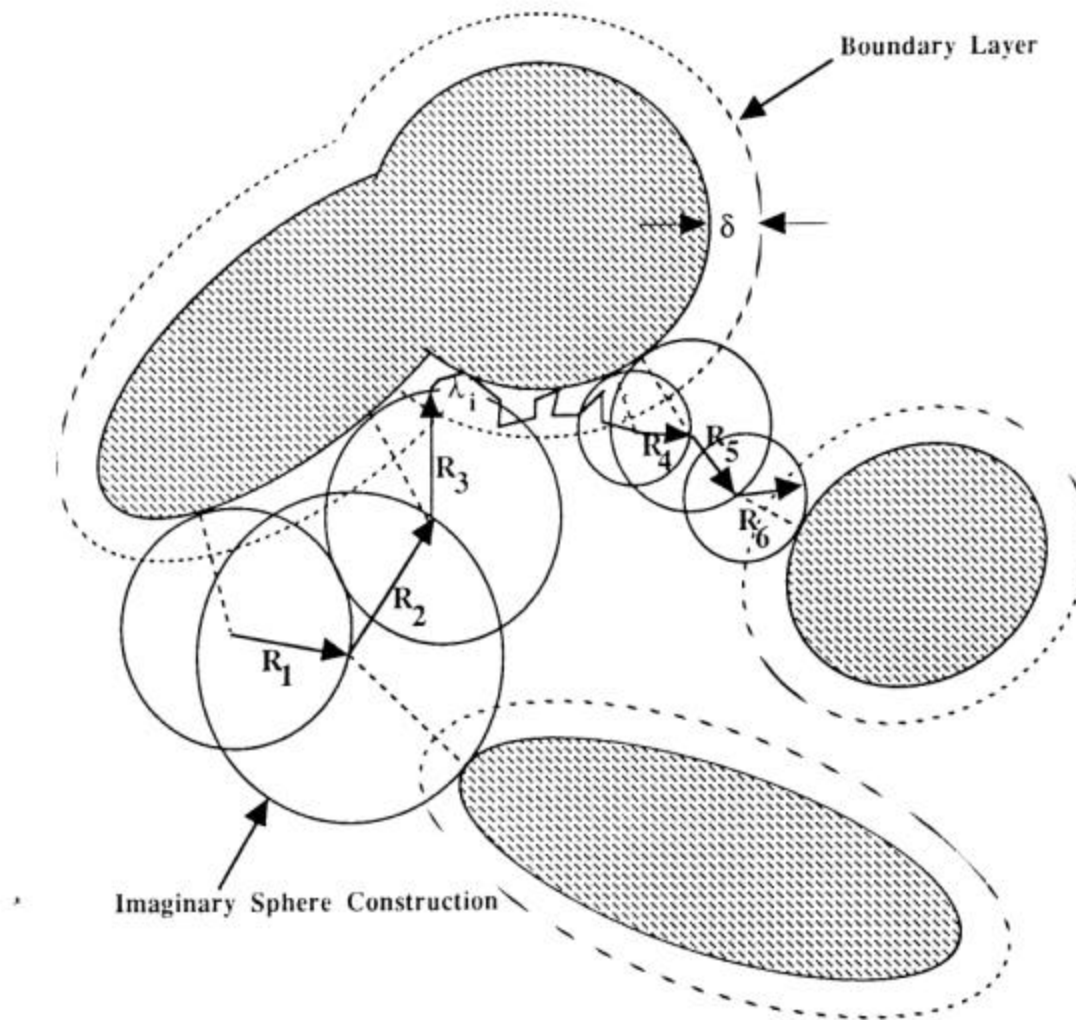


Surface Pit Distribution

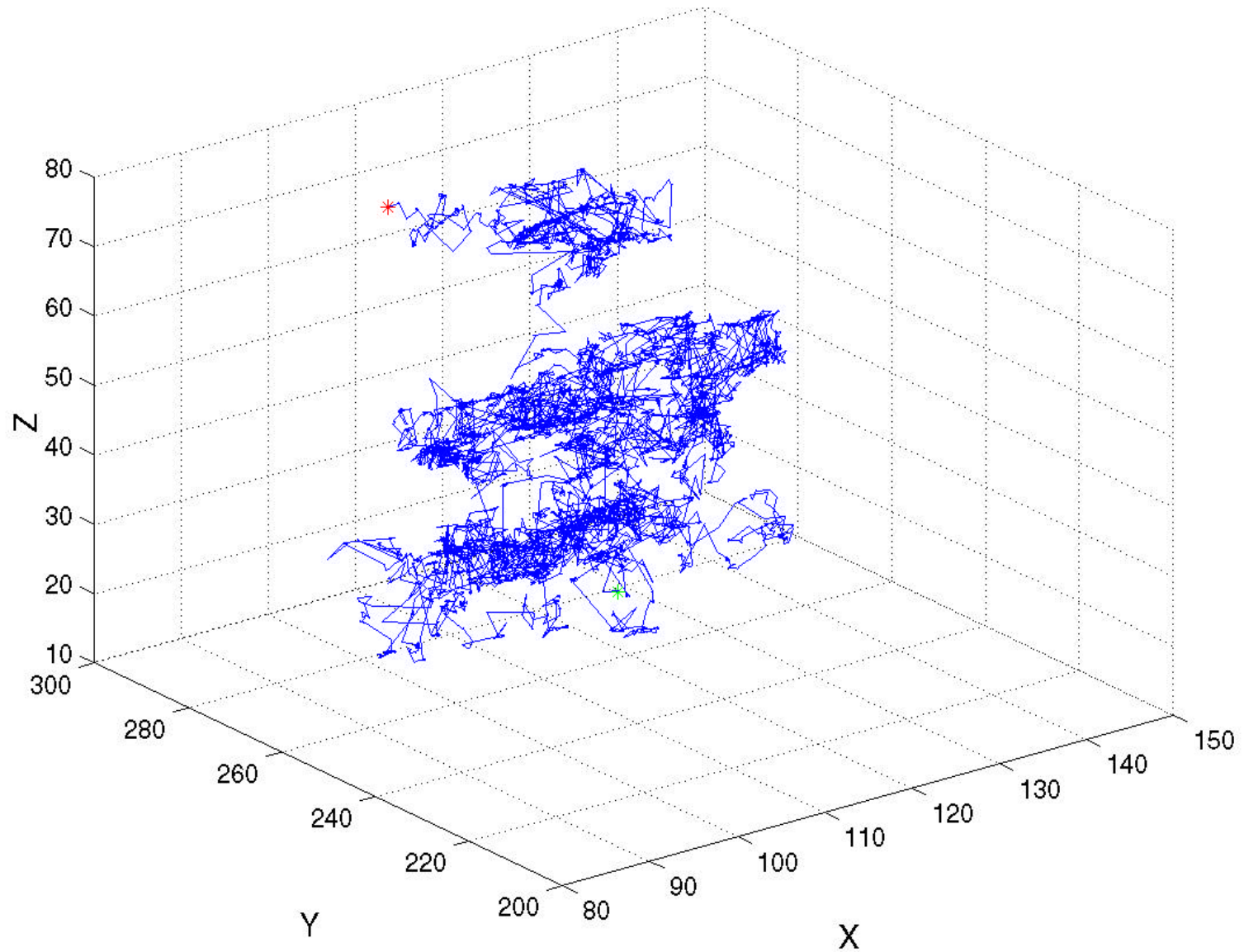




First Passage Time Technique^[2]



Random Walk Simulation^[6-10]



summary

X-ray micro computed tomography (X- μ CT)

Viable technique for visualization of 3D structure

In-plane, transverse and surface structure

Image analysis tools developed

Characterization of complex internal structure

Product design and development

Transport, mechanical, optical properties

Pore structure characteristics

Direct simulation using actual 3D structure

**Liquid permeability, vapor diffusivity,
conductivity etc.**

“Engineer” the 3D structure

