

## **Mechanics of indentation on highly porous solids**

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### **Abstract:**

An experimental study has been conducted to understand the deformation mechanics of highly porous solids during plane-strain wedge indentation. Gypsum was used as a model material to simulate high porosity solid having a porosity of about 79%. Indenters of different geometry are utilized to understand the effect of the indenter in the deformation process. The region around the tool is imaged in-situ by coupling a high-speed camera to a microscope. Series of images are captured during the process of indentation. These captured images are analyzed using an image-based correlation measurement technique called particle image velocimetry (PIV). PIV analysis has provided insights into the local flow characteristics such as velocity, strain rate fields, and the dead zones formed in the deformation zone. Dead zones are observed to form beneath the indenter during the process whose geometry varies with changes in porosity. An attempt has been made to understand the dead zones as a function of indenter geometry and porosity of the material.