

MEMORY OF PASTE : VISUALIZATION AS CRACK PATTERN AND NON-DESTRUCTIVE STRUCTURAL ANALYSIS

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A densely packed colloidal suspension, called a paste, remembers the direction of external forces, such as vibration, flow and magnetic field, even after the external field is removed, and these memories in paste can be visualized as morphology of desiccation crack patterns [1]. When a paste remembers the direction of vibration, desiccation cracks run in the direction perpendicular to the initial vibration, while desiccation cracks run along the direction of initial flow and magnetic field when the paste remembers the direction of flow and magnetic field [1-4]. The memory of vibration can be explained by residual tension theories [4-6]. However the mechanism of memory of flow is still under investigation.

Recent X-ray CT scan has been performed to dried magnetic pastes and it is revealed that the memory of magnetic field is stored as chain formation of magnetic particles along the magnetic field. The chain formation of magnetic particles along the magnetic field is confirmed by our numerical simulations.

There are many applications of the memory effect of paste. For example, the morphology of desiccation cracks can be controlled by imprinting the memory of external field into paste, and various desiccation crack patterns are produced, such as lamellar, radial, ring, spiral, lattice and so on. Examination of the memory in paste reveals what happened when the paste was in a plastic state. It would be a useful tool to know the history of ancient lithospheric phenomenon.

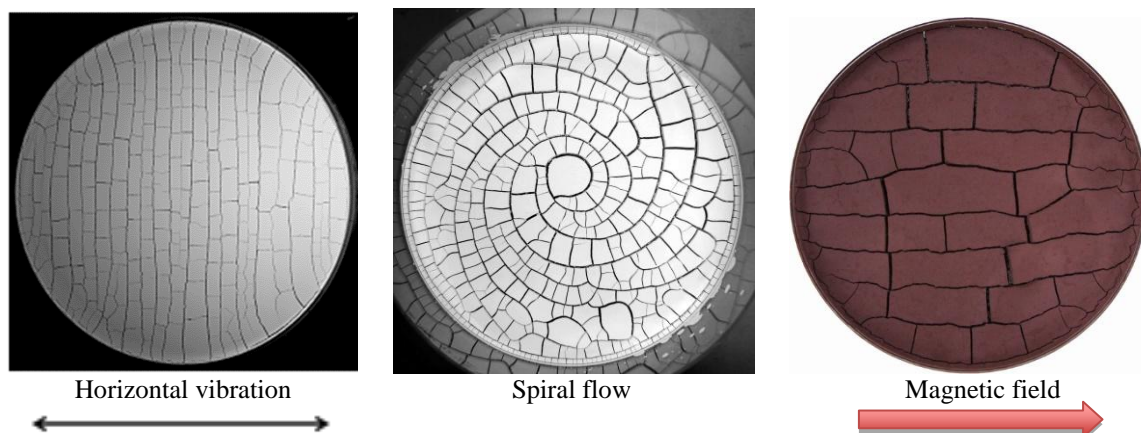


Figure 1. Visualization of memories of vibration, flow and magnetic field (from left to right) in paste as desiccation crack patterns

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