磁性流體複雜指狀化現象之實驗研究

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摘 要

本研究主要以實驗探討在Hele-Shaw cell 中，起始為一個幾 何圓形的磁性流體液滴，以CCD 相機拍攝空氣與磁性流體液滴的不可互溶界面及柴油與磁性流體液滴的可互溶界面，當磁性流 體液滴受到外加垂直磁場作用時，可互溶界面與不可互溶界面所 產生的複雜不穩定指狀化現象的過程。研究結果中顯示，在不可 互溶實驗方面，指狀物的成長速度及界面中所形成的指狀物個數 取決於外加磁場的大小。大直徑液滴小磁場實驗中形成的旋轉直 徑幾乎與小直徑液滴大磁場實驗中的相同。大Hele-Shaw cell 厚 度，指狀物有大的成長速度。在可互溶實驗方面，目前已經有了 一些初步的實驗結果，例如：指狀物的界面就與不可互溶完全不 一樣，因為在此界面中有包含兩種液體間的擴散與對流現象，所 以可以觀察出磁性流體與可互溶流體間的漸層現象，也因此擴散 與對流現象成為可互溶實驗的重要角色。

關鍵詞 : 複雜不穩定，Hele-Shaw cell，可互溶磁性流體。

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