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## Read to Learn!

In a note in *Physics Today* (Vol. 17, p 62, 1964) M. Reiner ascribes the knowledge that rock flows to the Prophetess Deborah. “In her famous song after the victory over the Philistines, she sang ‘The mountains flowed before the Lord.’ When, over 300 years ago, the Bible was translated into English, the translators... translated the passage as ‘The mountains *melted* before the Lord’--and so it stands in the authorized version. But Deboah knew two things. First, that the mountains flow, as everything flows. But second, that they flowed before the Lord, and not before man, for the simple reason that man in his short lifetime cannot see them flowing, while the time of observation of God is infinite. We may therefore well define as nondimensional number that Deborah number

$$D = (\text{time of relaxation}) / (\text{time of observation}).$$

The difference between solids and fluids is then defined by the magnitude of D.”

From a scientific point of view, then one should not ask whether a given piece of material is a solid or a fluid. If the Deborah number is large, the material *should be regarded* as a solid. Otherwise it should be regarded as a fluid.

「蓋將自其變者而觀之，則天地曾不能已一瞬；自其不變者而觀之，則物與我皆無盡也。」-----蘇軾前赤壁賦