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Critical Sensitivity in Rock Experiments

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Rupture in heterogeneous brittle media displays catastrophe and sample-specificity. Hence, the prediction of rupture is still questionable due to its complexity. Previous analytical works and numerical simulations suggested that critical sensitivity might be a possible common feature prior to catastrophe in these media. To validate the concept of critical sensitivity, a series of experiments has been conducted. 167 gabbro samples were compressed uniaxially and the damage process was observed with acoustic emission. The experimental results do support the concept of critical sensitivity reasonably. In addition, we found that the experimental results of sensitivity display fluctuations, while the sensitivity obtained from a previous theoretical model is a smooth curve. It is found that the discreteness of the distribution function of the mesoscopic unit's threshold might be a reason for the fluctuations shown in the critical sensitivity.

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