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Analysis of Tensile Testing of a Soft Ferromagnetic Elastic Strip Containing a Central Crack under a Magnetci Field

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This paper discusses the fracture behavior of a ferromagnetic plate under uniaxial tension. The effect of magnetic fields on the fracture mechanics parameters such as the stress intensity factor, energy release rate, energy density, etc. is discussed by analyzing the plane problems of a soft ferromagnetic strip with a central crack under a uniform magnetic field. The problem of an infinitely long soft ferromagnetic elastic strip with a central crack is formulated by means of integral transforms and reduced to the solution of a Fredholm integral equation of the second kind. Numerical values on the fracture mechanics parameters are obtained. Tensile tests are also conducted on center-cracked soft magnetic plate with strain gage technique, and the numerical predictions are compared with the test results. Agreement between theory and experiment is fair.

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