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Stress determination and manufacturing device of a bow-shaped specimen for testing metal stress corrosion

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This paper presents a method to determine the stress of a bow-shaped specimen and its manufacturing device, aiming at studying the stress corrosion of steel wire. The specimen is composed of curved bow frame and steel wire. The arch frame exerts a tensile stress on steel wire, which is one of the necessary prerequisites for the study of stress corrosion of metal wire. Based on the assumption of the geometry of the bow form and knowledge of mechanics, a semi-analytical model for determining the tensile stress of steel wire is established, and the main influence parameters are subsequently extracted. The accuracy and applicability of the semi-analytical model are evaluated by the experimental results. On this basis, a simple device for manufacturing the bow-shaped specimens is developed, which enables the mass production of bow-shaped specimens with target tensile stress level, and which significantly improves the efficiency of statistical tests for stress corrosion of metallic wire.

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