



## **DEVELOPMENT OF MAXIMUM SECONDARY CREEP STRAIN METHOD FOR LIFETIME OF HDPE PIPES**

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### **ABSTRACT**

Considering only the primary and secondary creep stages of high density polyethylene (HDPE) material, a Maximum Secondary Creep Strain Method (MSCS) and formula to calculate the maximum secondary creep strain has been developed based on existing test data and the creep law. Since the tertiary creep stage has a very short lifetime compared to the primary and secondary stages, it is reasonable to assume that rupture will occur once the creep strain reaches the maximum secondary creep strain. The implicit method of the finite element analysis (FEA) software, LS-DYNA <sup>[1]</sup>, is employed to determine the HDPE pipe primary creep process using an effective numeric algorithm <sup>[2]</sup> followed by a formula to determine the secondary creep process. The expression for the overall lifetime of the HDPE pipes is then derived. Based on the agreement between the numerical and test results, it is concluded that the MSCS method can accurately predict the long-term hydrostatic strength of a HDPE pipe.

**Keyword:** HDPE, primary creep, secondary creep, tertiary creep, pipe, LS-DYNA

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