Identification of the elasto-viscoplastic parameters for a thermoplastic polymer by instrumented indentation

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Abstract: The indentation test is a simple, fast and reliable tool that allows the determination of the materials mechanical properties from experimental load-penetration curves using the inverse computation methods. Through this approach and using the Berkovich indenter, the creep and elasto-plastic properties of the polymers were estimated. Simulations of the elasto-viscoplastic behaviour of the studied polymers under nanoindentation tests were performed. A finite element analysis was carried out to simulate the mechanical behaviour of polymers which can be defined by the Young's modulus E and the parameters (K and n) that describe the materials hardening for large deformations. The obtained functions from the numerical simulations were validated by nanoindentation and compression tests for the studied polymers.