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ABSTRACT

Flow induced residual stresses, formed during manufacturing, influence the crack initiation and growth process in polymer products. The effect of these residual stresses on mode-I parameters is studied using photoelasticity. Polycarbonate (PC) sheets having only flow induced residual stresses are used for making the single edge notched (SEN) specimen. Residual stresses in the PC sheet are measured using carrier fringe method. Two crack configurations, where residual stress is parallel and perpendicular to the crack axis are considered. The study showed that flow induced residual stress introduces an additional crack tip constraint which depends on the direction and magnitude of the residual stress. A new parameter is defined to quantify the residual stress induced crack tip constraint.

Key words: Flow Induced Residual Stress, Polycarbonate, *T*-stress, Crack Tip Constraint, Photoplasticity