L-shaped panel. The geometry and boundary conditions are as depicted in Fig.1, the external loading is applied through applying specific displacement. Material properties are Young's modulus $E_0 = 2.585 \times 10^4$ MPa, Poisson's ratio $v_0 = 0.18$, strength $\sigma_{max} = 2.7$ MPa, critical energy release rate $G_c = 0.09$ N/mm. The crack paths and load displacement curve s predicted by the four codes are shown in Fig. 2 and Fig. 3.
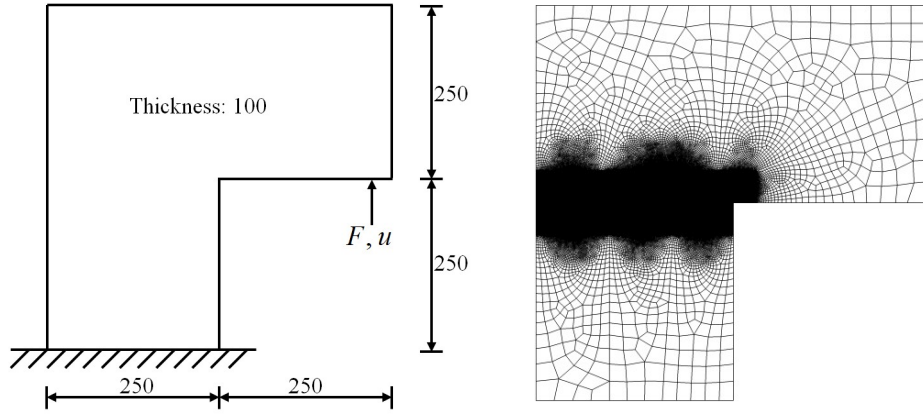
Fig.1. L-shaped panel: geometry, loading, boundary conditions and mesh (unit: mm).

(a) AT2 implicit (b) AT2 explicit (c) PF-CZM implicit (d) PF-CZM explicit
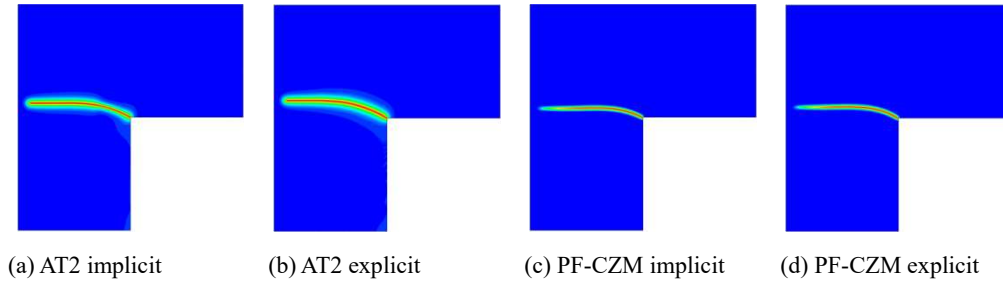
Fig. 2. Crack path predictions of the L-shaped panel, the internal length scale $l_0 = 5$ mm
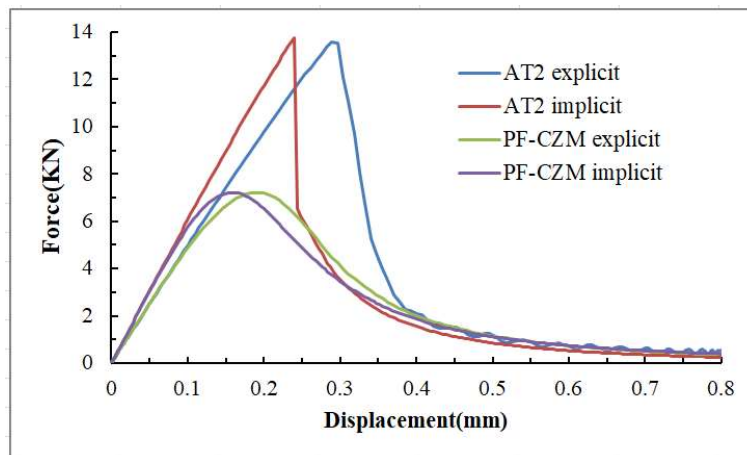
Fig.3. Load-displacement curves of the L-shaped specimen predicted with the four phase field models.