Normalized energy release rate  $\frac{G_{(\cdot\cdot)}}{G_0}$  as function of crack angular semi-aperture  $\Delta\theta$ , calculated with in-house VCCT and Abaqus built-in J-Integral (\*CONTOUR INTEGRAL) post-processing routines  $\frac{G_I}{G_0}$ , FEM-VCCT  $\frac{G_{II}}{G_0}$ , FEM-VCCT 0.7 $\frac{G_I + G_{II}}{G_0}$ , FEM-VCCT  $\frac{G_{TOT}}{G_0}$ , FEM-JINT, Contour 1  $\frac{G_{TOT}}{G_0}$ , FEM-JINT, Contour 2 0.65 $\frac{G_{TOT}}{G_{0}}$ , FEM-JINT, Contour 3  $\xrightarrow{G_{TOT}}$ , FEM-JINT, Contour 4  $\frac{G_{TOT}}{G_0}$ , FEM-JINT, Contour 5  $\frac{G_{TOT}}{G_0}$ , FEM-JINT, Contour 6 0.6  $\xrightarrow{G_{TOT}}$ , FEM-JINT, Contour 10 0.55 $\frac{G_{TOT}}{G_0}$ , FEM-JINT, Contour 11  $\frac{G_{TOT}}{G_0}$ , FEM-JINT, Contour 12  $\frac{G_{TOT}}{G_0}$ , FEM-JINT, Contour 13 0.5 $\frac{G_{TOT}}{G_2}$ , FEM-JINT, Contour 14  $\frac{G_{TOT}}{G_0}$ , FEM-JINT, Contour 15 0.45 $\frac{G_{TOT}}{G_0}$ , FEM-JINT, Contour 18  $\frac{G_{TOT}}{G_0}$ , FEM-JINT, Contour 19  $\frac{G_{TOT}}{G_0}$ , FEM-JINT, Contour 20 -  $\frac{G_I}{G_0}$ , BEM 0.4 $\frac{G_{II}}{G_0}$ , BEM  $G_{I}^{-1}$ , BEM 0.30.250.20.150.1  $5\cdot 10^{-2}$ 10 20 30 40 50 60 80 110 120 130 140 70 90 100 150 160 170 180  $\Delta\theta\,[^\circ]$