FORMULA 4.272.2

$$\int_0^1 \frac{(1+x)\,\ln^{q-1}(1/x)\,dx}{1+2x\cos t+x^2} = \frac{\Gamma(q)}{\cos\frac{t}{2}}\sum_{k=1}^{\infty}\frac{(-1)^{k-1}}{k^q}\cos\left[(k-\tfrac{1}{2})t\right]$$