King's Integral

Enigma n°11
(Inspired from Putnam 2013)

2nd December 2022

Solve the following integral:

$$\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{1}{1 + \tan(x)^{2022}} dx$$

Round the value to 0.01.[1]

Hint: *The King property might be useful.*

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[1] if the answer is $\frac{123}{1000}$, please enter 0.12 and not $0, 12$.