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**Exact Analytical Interconversion Between Durometer Hardness Scales** A. JEFFREY GIACOMIN, PETER H GILBERT, Queen's University — Previous work has related Young's modulus to durometer hardness for any standardized scale. In this paper, we build on this work to solve explicitly and exactly for the hardness in any one standardized durometer hardness scale as a function of the hardness in any other target scale. We find that when the target scale is for a flat indenter, the conversion is algebraic and straightforward. However, when the target scale is for an indenter that is not flat (conical or hemispherical), the exact explicit analytical solution requires a power series inversion, said series involving beta functions and solutions to a set of integer equations.

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