Huanyu Chen, Danyong Zhao, Jernej Barbic: Capturing Animation-Ready Isotropic Materials Using Systematic Poking, ACM Transactions on Graphics 42(6) (SIGGRAPH Asia 2023), Dec 2023.

The below table gives several elastic materials, as well as their f, g and h functions, wherever applicable.

Material Model Name	Material Energy Density Function	Parameters	Val.-Landel expressible	f(x)	f"(x)	g(x)	g"(x)	h(x)	h"(x)
Linear Corotational (Seth-Hill $\alpha = 1$)	$\mu((\lambda_1-1)^2+(\lambda_2-1)^2+(\lambda_3-1)^2) + \frac{\lambda}{2}(\lambda_1+\lambda_2+\lambda_3-3)^2$	μ, λ	Yes	$\mu(x-1)^2 + \frac{\lambda}{2}(x-1)(x-5)$	$2\mu+\lambda$	$\lambda(x-1)$	0	0	0
St. Venant-Kirchhoff (Seth-Hill $\alpha = 2$)	$\frac{\mu}{4}((\lambda_1^2-1)^2+(\lambda_2^2-1)^2+(\lambda_3^2-1)^2) + \frac{\lambda}{8}(\lambda_1^2+\lambda_2^2+\lambda_3^2-3)^2$	μ, λ	Yes	$\frac{\mu}{4}(x^2-1)^2 + \frac{\lambda}{8}(x^2-1)(x^2-5)$	$\mu(3x^2-1) + \frac{3}{2}\lambda(x^2-1)$	$\frac{\lambda}{4}(x^2-1)$	$\frac{\lambda}{2}$	0	0
Hencky (Seth-Hill $\alpha = 0$)	$\mu(\log^2\lambda_1+\log^2\lambda_2+\log^2\lambda_3) + \frac{\lambda}{2}\log^2(\lambda_1\lambda_2\lambda_3)$	μ, λ	Yes	$\mu\log^2 x$	$2\mu\frac{1-\log x}{x^2}$	0	0	$\frac{\lambda}{2}\log^2 x$	$\lambda\frac{1-\log x}{x^2}$
Seth-Hill family	$\frac{\mu}{\alpha^2}((\lambda_1^\alpha-1)^2+(\lambda_2^\alpha-1)^2+(\lambda_3^\alpha-1)^2) + \frac{\lambda}{2\alpha^2}(\lambda_1^\alpha+\lambda_2^\alpha+\lambda_3^\alpha-3)^2$	μ, λ, α	Yes	$\frac{\mu}{\alpha^2}(x^\alpha-1)^2 + \frac{\lambda}{2\alpha^2}(x^\alpha-1)(x^\alpha-5)$	$(2\mu+\lambda)\frac{2\alpha-1}{\alpha}x^{2\alpha-2} - (2\mu+3\lambda)\frac{\alpha-1}{\alpha}x^{\alpha-2}$	$\frac{\lambda}{\alpha^2}(x^\alpha-1)$	$\lambda\frac{\alpha-1}{\alpha}x^\alpha$	0	0
Hill family	$\mu\left(f^2(\lambda_1)+f^2(\lambda_2)+f^2(\lambda_3)\right) + \frac{\lambda}{2}\left(f(\lambda_1)+f(\lambda_2)+f(\lambda_3)\right)^2$	μ, λ, f	No						
Neo-Hookean (standard version)	$\frac{\mu}{2}(\lambda_1^2+\lambda_2^2+\lambda_3^2-3) - \mu\log(\lambda_1\lambda_2\lambda_3) + \frac{\lambda}{2}\log^2(\lambda_1\lambda_2\lambda_3)$	μ, λ	Yes	$\frac{\mu}{2}(x^2-1) - \mu\log x$	$\mu\left(1+\frac{1}{x^2}\right)$	0	0	$\frac{\lambda}{2}\log^2 x$	$\lambda\frac{1-\log x}{x^2}$
Neo-Hookean (Ogden)	$\frac{\mu}{2}(\lambda_1^2+\lambda_2^2+\lambda_3^2-3) - \mu\log(\lambda_1\lambda_2\lambda_3) + \frac{\lambda}{2}(\lambda_1\lambda_2\lambda_3-1)^2$	μ, λ	Yes	$\frac{\mu}{2}(x^2-1) - \mu\log x$	$\mu\left(1+\frac{1}{x^2}\right)$	0	0	$\frac{\lambda}{2}(x-1)^2$	λ
Stable Neo-Hookean ([Smith 2018])	$\frac{\mu_{pixar}}{2}(\lambda_1^2+\lambda_2^2+\lambda_3^2-3) - \frac{\mu_{pixar}}{2}\log(\lambda_1^2+\lambda_2^2+\lambda_3^2+1) + \frac{\lambda_{pixar}}{2}(\lambda_1\lambda_2\lambda_3-\alpha)^2$	$\mu_{pixar}, \lambda_{pixar}$ $\alpha = 1+\frac{3\mu}{4\lambda}$	No						
STS material ([Pai 2018])	$\frac{\mu}{2}(\lambda_1^2+\lambda_2^2+\lambda_3^2-3) - \mu\log(\lambda_1\lambda_2\lambda_3) + \frac{\lambda}{2}\log^2(\lambda_1\lambda_2\lambda_3) + \frac{\mu_4}{8}((\lambda_1^2-1)^4+(\lambda_2^2-1)^4+(\lambda_3^2-1)^4)$	μ, μ_4, λ	Yes	$\frac{\mu}{2}(x^2-1) - \mu\log x + \frac{\mu_4}{8}(x^2-1)^4$	$\mu\left(1+\frac{1}{x^2}\right) + \mu_4(x^2-1)^2(7x^2-1)$	0	0	$\frac{\lambda}{2}\log^2 x$	$\lambda\frac{1-\log x}{x^2}$
Ogden	$\sum_{p=1}^{N}\frac{\mu_p}{\alpha_p}\left(\lambda_1^{\alpha_p}+\lambda_2^{\alpha_p}+\lambda_3^{\alpha_p}-3\right)$	μ_p, α_p	Yes	$\sum_{p=1}^{N}\frac{\mu_p}{\alpha_p}(x^{\alpha_p}-1)$	$\sum_{p=1}^{N}\mu_p(\alpha_p-1)x^{\alpha_p-2}$	0	0	0	0
Mooney-Rivlin	$C_1(\lambda_1\lambda_2\lambda_3)^{-2/3}(\lambda_1^2+\lambda_2^2+\lambda_3^2-3) + C_2(\lambda_1\lambda_2\lambda_3)^{-4/3}(\lambda_1^2\lambda_2^2+\lambda_2^2\lambda_3^2+\lambda_3^2\lambda_1^2-3)$	C_1, C_2	No Yes if $J = 1$	$C_1(x^2-1)$		$C_2(x^2-1)$			