The Interface Friction PyRolL Plugin

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The Interface Friction plugin serves as a base package for other plugins which include friction to calculate relevant process values. It is mainly intended for calculations regarding groove filling, spread, stresses as well as forces and torques witch result from the process. For further descriptions regarding friction in metal forming processes see Black, Kopalinsky, and Oxley [1] or Wilson and Sheu [2].

1 Model Approach

The interface friction model introduces two variables as hooks. Namely, these variables are the friction coefficient (μ) according to Coulomb's sliding friction model as well as a friction factor (m) which is used for sticking friction. Both values can be calculated using the respective other through a equation given by Wanheim and Bay [3].

$$\mu = \frac{m}{1 + \frac{\pi}{2} + \arccos(m) + \sqrt{1 - m^2}} \tag{1}$$

2 Usage Instructions and Implementation Details

Packages residing on friction shall depend on this plugin to create a common interface. In the following, the hooks defined by this plugin shall be described.

Friction coefficient of Coulombs friction model used for sliding friction.

Friction factor for sticking friction.

References

[1] A. J. Black, E. M. Kopalinsky, and P. L. B. Oxley. "Asperity Deformation Models for Explaining the Mechanisms Involved in Metallic Sliding Friction and Wear—A Review". In: *Proceedings of the Institution of Mechanical Engineers, Part C: Journal of Mechanical Engineering Science* 207.5 (Sept. 1993), pp. 335–353. DOI: https://doi.org/10.1243/PIME_PROC_1993_207_138_02.

[2] W. R. D. Wilson and S. Sheu. "Real Area of Contact and Boundary Friction in metal forming". In: *International Journal of Mechanical Sciences* 30.7 (1987). Citation Key: Wilson1987, pp. 475–489.

[3] T. Wanheim and N. Bay. "A Theoretically determined model for friction in metal working processes". In: *Wear* 28 (1974). Citation Key: Wanheim1974.