

The Hill Spreading PyRoll Plugin

Christoph Renzing

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This plugin provides a spreading modelling approach with Hill's formula for flat rolling.

1 Model approach

1.1 Hill's spread equation

Hill [1] proposed Equation 1 for estimation of spreading in flat rolling, h and b are height and width of the workpiece with the indices 0 and 1 denoting the incoming respectively the outgoing profile.

$$\beta = \frac{b_1}{b_0} = \frac{h_0^w}{h_1} \quad (1)$$

w is the spread exponent, by Hill [1] is given in Equation 2, where R is the roll radius.

$$w = 0.5 \exp \left(-\frac{b_0}{2\sqrt{R\Delta h}} \right) \quad (2)$$

2 Usage instructions

The plugin can be loaded under the name `pyroll_hill_spreading`.

An implementation of the `spread` hook on `RollPass` is provided, calculating the spread using the equivalent rectangle approach and hill's model.

Base implementations of them is provided, so it should work out of the box. For `hill_exponent` the equation 2 is implemented. Provide your own hook implementations or set attributes on the `RollPass` instances to alter the spreading behavior.

References

- [1] R. Hill. *Letter to A. W. McCrum*. eng. 1955.