A Study on Metal Plate Flat Rolling

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ABSTRACT

ABSTRACT This paper discussed the stress distribution of contact arc between roller and strip when the cold rolling is forming. After discussing, analyzing and comparing the existing research paper, the authors try to find a more reasonable math formula. In addition to the deformation of roller and the characteristic of plasticity stiffness body''s work hardening, the authors discuss further about the influence that the tension stress of strip has on the stress S distribution of rolling. The numerical analysis methods that are used to solve the distribution of normal rolling force S in this paper are fourth-order Runge-Kutta integral, Simpson''s integral and Trapez integral. According to the result of research, in the coordinate of the normal stress of roller and contact arc, the neutral point of the curve will become small and move to exit when the roller takes the behind pulling force. Because of the pulling force, there is enough energy for the plasticity deformation of the strip. It can mitigate the force on the roller. If the roller takes froward pulling force, the neutral point of the curve will become small and move to the entrance. Therefore, the neutral point will move more forward and the system will be more stable. Then, there will be better product of strip work. If there are both forward and behind pulling forces, the neutral point of the curve will decrease a lot. It means that the stress of the roller will decrease. This is the best condition. The tenure of use of the roller can lengthen and save the energy for the deformation of plasticity. Besides, the neutral point of the curve will move to the entrance of roller contact arc in the process of work hardening. So the roller strip will be more even and smooth and it is closer to the experimental data. Therefore, the consideration of work hardening is also very important. From the distribution of shear stress, we can know that the maximum of the shear stress will be on the neutral point of the curve. Furthermore, the authors will compare the result of this research with the data researched by Momati and Mcelwain, and the experimental data researched by Firband and Lancaster. This can prove that the analysis of the data matches the experimental data.

Keywords : Rolling ; Numerical analysis

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