EFFECT OF SOLIDS ON A PINCHED SLUICE
CONCENTRATOR

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ABSTRACT

The pinched sluice concentrator is a device for the separation of heavy minerals particularly beach sands. They come in a variety of size and shapes and have been extensively used in the beach industry, for over a century. But the basic mechanism involved in the specifications has not been fully understood.

Most of the work up to 1982, had been empirical in nature. In 1983, an attempt was made to explain the behavior of a pinched sluice in items of established theories of fluid mechanics and mineral processing.

However, their work was limited to particles of single size. In the present analysis, an attempt has been made to refine the existing model, taking the effects of particle size and density into account.

The relationship between the flow rate and depth of flow was confirmed and there, variation with particle size and feed concentration has been studied.

A method has been developed to calculate the underflow flow rate of the sluice assuming logarithmic velocity distribution and the established relationship between Froude Number and the split height.

Assuming that Bagnolds Shearing Theory holds in pinched sluice, operations, and also the dispersive pressure is some function of solid concentration, velocity gradient, specific gravity and diameter of the particles, a relationship was derived to predict the underflow pulp density. Above relationship was used to predict the grade of the underflow for a mixture of ilmenite and silica.