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Roping: Is it an optimum dewatering performance condition in a hydrocyclone?

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Abstract

It is well known that the underflow discharge pattern in a hydrocyclone reflects indirectly the operating state of it. In the present article, an analytical approach towards explaining the formation of a rope discharge has been attempted. It has been further established that the rope state depends on the flow pattern prevailing inside a hydrocyclone at any given condition. Any change in the process and design parameters will actually alter the flow pattern inside the hydrocyclone and hence, it would be reflected in the discharge pattern. Therefore, an attempt has also been made to indicate the parameters responsible for rope formation. The analysis has been validated with systematic experimental data generated in a 50.8mm diameter hydrocyclone housed in a conventional closed circuit test rig. The discharge pattern of the underflow has been captured using a commercially available digital camera and subsequently measured the discharge angle using an image processing algorithm developed on MATLABTM platform. Furthermore, a comparative study has been done between the available models on rope formation and the developed model with a requisite set of experimental data. Finally, based on the evidence of the present study, it has been established that the rope condition does not necessarily indicate a favorable dewatering condition.

Keywords: Hydrocyclone; Rope formation; Dewatering

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