NUMERICAL INVESTIGATION OF UPSTREAM SWIRLING MOTION ON FLOW OF CONCENTRATED SLURRY IN HORIZONTAL PIPES

A project/ thesis submitted in partial fulfilment of the requirements

for the degree of

Bachelor of Technology

by

Pawan Kumar(20104051)

Silaparasetty Kumar(20104064)

Under the guidance of

Dr. Pankaj K Gupta

Department of Mechanical Engineering
School of Studies Engineering and Technology
Guru Ghasidas Vishwavidyalaya
Bilaspur
Session 2020-2024

Department of Mechanical Engineering
School of Studies of Engineering and Technology
Guru Ghasidas Vishwavidyalaya, Bilaspur, (C.G)

Certificate by the Examiners

This is to certify that the project work entitled **"NUMERICAL INVESTIGATION OF UPSTREAM SWIRLING MOTION ON FLOW OF CONCENTRATED SLURRY IN HORIZONTAL PIPES "**

Submitted by:

Name	Roll No.	Enrollment No.
Pawan Kumar	20104051	GGV/20/01750
Silaparasetty Kumar	20104064	GGV/20/01764

has been examined by the undersigned as a part of an examination of the B.Tech (Mechanical Engineering) 8th semester project at the Department of Mechanical Engineering, School of Studies of Engineering & Technology, Guru Ghasidas Vishwavidyalaya (A Central University) Bilaspur, (C.G)

06/5/2024

Internal Examiner

Date:

06/05/2024

External Examiner

Date:

06/05/2024

विभागाध्यक्ष/Head
यांत्रिकी अभियांत्रिकी विभाग/Mechanical Engg. Dept
प्रौद्योगिकी संस्थान/Institute of Technology
गुरु घासीदास वि.वि./Guru Ghasidas V.V.
कोनी, बिलासपुर (छ.ग.)/Koni, Bilaspur (C.G.)

Abstract

The transportation of concentrated slurries through horizontal pipelines presents a complex fluid dynamics scenario. This report presents a comprehensive numerical investigation aimed at understanding the effects of upstream swirling motion on the flow behavior of concentrated slurries within horizontal pipes subjected to swirling motion. We compared the CFD results and experimental[#] results for normal cross section pipe of diameter 0.103m. To introduce the swirling-motion in the pipeline of diameter 0.103m we attached a swirling section having 'pitch to diameter ratio' 6 and number of lobes are 3,4 &5. For all the three different lobes, study is carried out for volume fraction 19%, 29% & 33% at the two different inlet velocity 3m/s and 5 m/s having two different sand particle size 90 microns and 290 microns. Concentration of sand before the swirling motion and after the swirling motion is major focus of study. Swirl intensity or swirl number which is rapidly declining but after 10.3m from the swirl section its small effect can be seen for 3,4 &5 lobe. Pressure gradient for all the cases is calculated and comparison is made between 3,4 & 5lobe and how it varies with the volume fraction and particle size.

Keywords: Numerical investigation, CFD, Swirling motion, volume fraction, pressure gradient & swirl number

Contents

List of Figures

List of Tables