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## Effects of Curvature Radius Ratio of 90-Degree Pipe Elbow on FIV Signal

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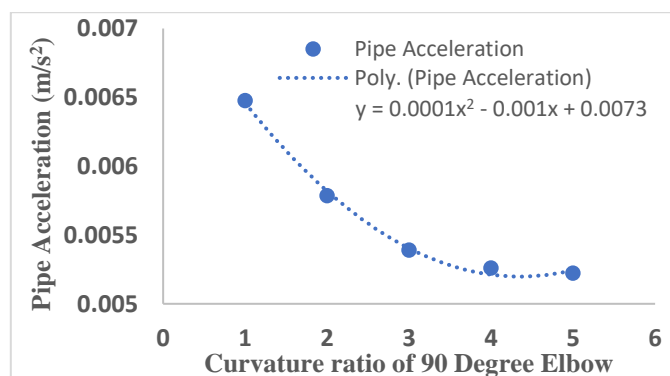
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### Abstract

Investigation on Flow Induced Vibration (FIV) in pipes is relatively new. Previous publications focused on characterizing the influences of geometric and material properties of a straight pipe. The current study investigates the influence of the curvature radius ratio in a 90-degree pipe elbow for ratios ( $R_c/D = 1.5, 2, 2.5, 3$  and  $3.5$ ). Reynolds Stress Model (RSM) is coupled with a finite element structural model to simulate the fluid-structure interaction (FSI) using one-way coupling. The RSM turbulence model and FSI model are validated against published experimental and numerical results [1] [2] [3]. Preliminary results presented in the figure below indicate that vibration signal increases as the curvature ratio decreases in a quadratic manner. This functional relationship can be used as a design tool, and with further application in improving non-intrusive flow measurement techniques.



### References

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- [3] Pittard, M. T., Evans, R. P., Maynes, R. D., and Blotter, J. D. "Experimental and Numerical Investigation of Turbulent Flow Induced Pipe Vibration in Fully Developed Flow." *Review of scientific instruments*, Vol. 75, No. 7, 2004, pp. 2393–2401.