Flow Past Nine Cylinders In Square Configuration

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Abstract

The main focus of this study is to observe the effect of centre-to-centre spacing ratio, L/D and Reynolds number, Re on the value of drag force on one of 9 different cylinders placed in a square configuration. The centre-to-centre ratio was fixed as 1.5 and Reynolds number was varied in the range 1500 - 2000. It was found that the residuals and the drag forces do not converge to a fixed value but instead keep oscillating about a mean. Moreover the fluctuations are influenced by Reynolds number.

1 Problem Statement

Consider a channel of dimensions **1 m** $\times$**0.6 m** $\times$**0.3 m** with 9 cylinders dipped in it at the centre. Let the diameter of the cylinders be **20 mm** and let the dominant length scale be the diameter of the cylinder. Target is to find the drag force on the first cylinder for the following cases:
Fluid: Water, hypothetical
L/D: 1.5
Re: 1500, 2000

Figure 1: *Top View of the channel*