Poiseuille Flow in a Duct of Rectangular Cross Section

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Abstract. Ducts are configurations that inflate or exhaust air throughout a building, thus negating the need to use fans installed in strategic locations. In fact, ducts are the most used way to transport air, promoting one of the most priority actions currently in a corporate space: air renewal to promote comfort in the workplace. A good air distribution and circulation design aims at an effective balancing of the system in order to maintain the optimum conditions of comfort and safety in the environment to be conditioned, together with low operating and maintenance costs. In the present study, we investigate a classical fluid dynamics problem: the Poiseuille flow in a duct of rectangular cross section. We solve this problem analytically using separation of variables and numerically using finite differences.