NUMERICAL SIMULATION AND DYNAMIC CHARACTERISTICS ANALYSIS OF PULVERIZED COAL TRANSPORTATION IN ANNULAR TUBES

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.In directional drilling process, the tube transport technology is a key factor to ensure the drilling process. This paper mainly studies the dynamic characteristics of tubes in the case of liquid filling. Consider the case where there is a transport fluid inside the tube, and the horizontal tube model is established. Based on the vibration characteristics of the tube, an added mass coefficient is proposed to calculate the natural frequency of the tube. Through the numerical simulation, analyzing the influence of different external conditions (fluid velocity, medium concentration) on the velocity distribution, volume fraction distribution and pressure drop model of the tube in different sections. Moreover, the natural characteristics of the tube depend on the tube design parameters (length, radius, etc.) and the volume fraction of liquid filled in the tube. Experiments verified that changing the tube design parameters can calculate the natural frequency of the tube directly. Therefore, it is feasible to propose the method of attaching the liquid mass to the tube itself to obtain the natural frequency of the tube.

According to the research, it can be concluded that : (i) The natural frequency of the tube decreases as the length of the tube increases; (ii) The increase of the volume fraction of the liquid in the tube significantly reduces the natural frequency of the tube; (iii) The velocity of the fluid in the tube has less effect on the natural characteristics of the tube itself; (ⅳ) The added mass coefficient of fluid is not a fixed value, it varies with the volume fraction of fluid in the tube.

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