

柴油机壁流式过滤体捕集与流阻性能影响规律 Characteristics of Filtration and Flow-resistance of Wall-flow Diesel Particulate Filter

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摘要: 根据气流在柴油机壁流式微粒捕集器内的流动特点, 将过滤壁面假设为由若干球状单元组成, 建立了壁流式过滤体捕集过程的数学模型。研究了排气特征、过滤体结构参数对壁流式过滤体捕集及流阻性能的影响规律。结果表明, 减小排气流量、增大过滤体体积等方法, 既能优化捕集性能, 又能优化流阻性能; 减小过滤体长径比, 能优化流阻性能, 而对捕集性能没有影响; 增大过滤壁厚度, 能优化捕集性能, 但会使流动性能恶化; 改变排气温度和孔道宽度, 对捕集性能及流阻性能的影响都较小。最后通过试验验证了数学模型的准确性。Based on the air-flow characteristics of diesel wall-flow particulate filter, the mathematical model of loading process for the wall-flow filter was proposed. In this model, the porous wall was assumed to be composed of numerous spherical collectors. The effects of the exhaust-flow characteristic and the structural parameter of filter on the over-all properties of filter were analyzed. The results showed that decreasing exhaust-flow and increasing volume of filter optimize the characteristics of filtration and flow-resistance. Decrease in the ratio of length to diameter of filter optimize flow-resistance, whereas has no influence on filtration. Increment in wall thickness optimizes filtration, whereas deteriorates flow-resistance. Exhaust temperature and channel width both have a minor influence on both filtration and flow-resistance. The experimental results verified the accuracy of mathematical model.

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