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A fractal analysis for Darcy and non-Darcy permeability in porous media

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Abstract: This paper further studied the pore throat model, by fractal equation with Forchheimer equation, obtained the analytical expressions of Darcy permeability, non-Darcy equivalent permeability, and the ratio of non-Darcy equivalent permeability and Darcy permeability. Darcy permeability is the function of porosity, average particle size, fractal dimension, is not the function of Reynolds number, the conclusion is consistent with the permeability definition that permeability is related to medium skeleton and has nothing to do with the fluid flow in the medium. Non-Darcy equivalent permeability is a function of the Reynolds number and decrease with the increase of Reynolds number; it is the same with dimensionless results of Barree and Conway's. Using dimensionless form for non-Darcy equivalent permeability, get the ratio of non-Darcy equivalent permeability and Darcy permeability.

Keywords：Darcy and non-Darcy flow, fractal equation, Forchheimer equation, Reynolds number

References

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