ANALYTICAL STUDY FOR NATURAL CONVECTION WITH POROUS MEDIUM IN A MICRO HORIZONTAL CYLINDRICAL ANNULUS WITH CONSTANT HEAT GENERATION

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SUMMARY: We consider the two-dimensional problem of steady natural convection in a narrow horizontal cylindrical annulus filled with porous medium due to a constant temperature variation on the outer and at the inner boundaries with constant volumetric heat generation. The solution is expanded in powers of a single combined similarity parameter, which is the product of the gap ratio to the power of two, and Rayleigh number. The series is extended by means of symbolic calculation up to 16 terms. Analysis of these expansions allows the exact computation for arbitrarily accuracy up to 50000 figures. Although the range of the radius of convergence is small, but Pade approximation leads our results to be good even for much higher value of the similarity parameter.