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ENHANCED HEAT TRANSFER IN HYBRID NANOFLUID: ROLE OF SUCTION AND WEDGE ANGLE ON BOUNDARY LAYER DYNAMICS

(Peningkatan Pemindahan Haba dalam Nanobendalir Hibrid: Peranan Sedutan dan Sudut Baji Terhadap Dinamik Lapisan Sempadan)

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ABSTRACT

This study offers a numerical investigation of steady MHD flow and heat transfer characteristics of hybrid nanofluids past a permeable stretching/shrinking wedge. The study considers the effect of suction as well as an internal heat source. Similarity transformations are applied to convert the governing partial differential equations into a system of ordinary differential equations and solved numerically using MATLAB's bvp4c function. The results reveal the existence of dual solutions for suction and shrinking parameters over certain ranges. Besides, the study also illustrates that increasing both the suction parameter and the wedge angle resulted in a higher Nusselt number which implies an enhancement in the heat transfer rate.

Keywords: suction; wedge angle; shrinking sheet; hybrid nanofluids; MHD

ABSTRAK

Kajian ini menawarkan penyelidikan berangka mengenai aliran malar MHD dan ciri pemindahan haba nanobendalir hibrid pada permukaan baji meregang/mengecut. Kajian ini mempertimbangkan kesan sedutan serta sumber haba dalaman. Penjelmaan keserupaan digunakan untuk menukarkan persamaan pembezaan separa yang kemudian dijelmakan kepada sistem persamaan pembezaan biasa dan diselesaikan secara kaedah berangka melalui aplikasi fungsi bvp4c dalam MATLAB. Hasil kajian menunjukkan wujud penyelesaian dual bagi parameter sedutan dan pengecutan dalam julat tertentu. Selain itu, kajian ini juga menggambarkan bahawa dengan meningkatkan kedua-dua parameter sedutan dan sudut baji, nombor Nusselt akan menjadi lebih tinggi, seterusnya menunjukkan peningkatan dalam kadar pemindahan haba.

Kata kunci: sedutan; sudut baji; permukaan mengecut; nanobendalir hibrid; MHD

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