

Abstract Submitted  
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**Experimental investigation of the flow field and power consumption characteristics of regular and fractal blade impellers in a dynamic mixer**<sup>1</sup> K. STEIROS, P.J.K. BRUCE, O.R.H. BUXTON, J.C. VASSILICOS, Imperial College London — Experiments have been performed in an octagonal un-baffled water tank, stirred by three radial turbines with different geometry impellers: (1) regular rectangular blades; (2) single-iteration fractal blades; (3) two-iteration fractal blades. Shaft torque was monitored and the power number calculated for each case. Both impellers with fractal geometry blades exhibited a decrease of turbine power number compared to the regular one (15% decrease for single-iteration and 19% for two iterations). Phase locked PIV in the discharge region of the blades revealed that the vortices emanating from the regular blades are more coherent, have higher kinetic energy, and advect faster towards the tank's walls where they are dissipated, compared to their fractal counterparts. This suggests a strong link between vortex production and behaviour and the energy input for the different impellers. Planar PIV measurements in the bulk of the tank showed an increase of turbulence intensity of over 20% for the fractal geometry blades, suggesting higher mixing efficiency. Experiments with pressure measurements on the different geometry blade surfaces are ongoing to investigate the distribution of forces, and calculate hydrodynamic centres of pressure.

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