1 **Coupling catalytic bed fluidization with impeller rotation for**

2 **improved hydrodynamic characterization of Berty reactors**

3 Mengmeng Cui[a], Shekhar R. Kulkarni[a], Yacoub-Yousef Abu-Naaj[b], Stefan Wagner[b], Claudia Berger-Karin[b], Jan

4 Lennart Weber[b], Anton Nagy[b], Pedro Castaño[a,c]*

5 [a] *Multiscale Reaction Engineering, KAUST Catalysis Center (KCC), King Abdullah University of Science and*

6   *Technology (KAUST), Thuwal, 23955-6900, Saudi Arabia*

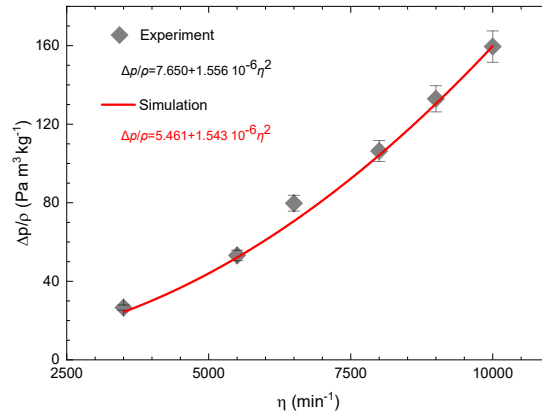7 [b] *ILS – Integrated Lab Solutions GmbH, 12489 Berlin, Germany*

8 [c] *Chemical Engineering Program, Physical Science and Engineering (PSE) Division, King Abdullah University*

9   *of Science and Technology*

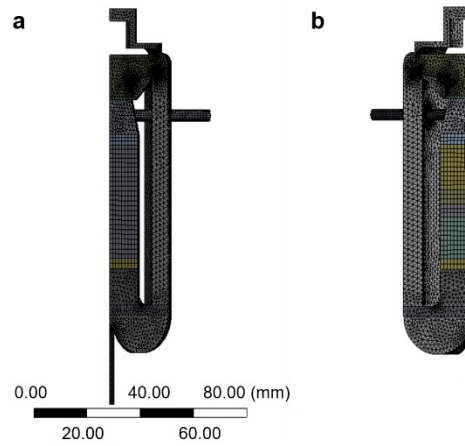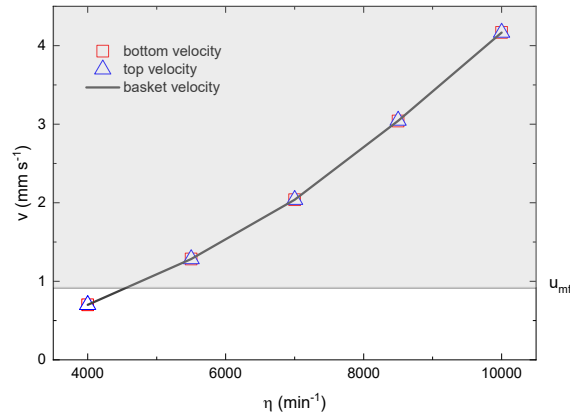10 * Corresponding authors: pedro.castano@kaust.edu.sa

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15 Figure S1. Compared impeller relationships of the simulation and experiment.[1]

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17 Figure S2. (a) A mesh model assuming a homogeneous porous zone for the bed; (b) a mesh
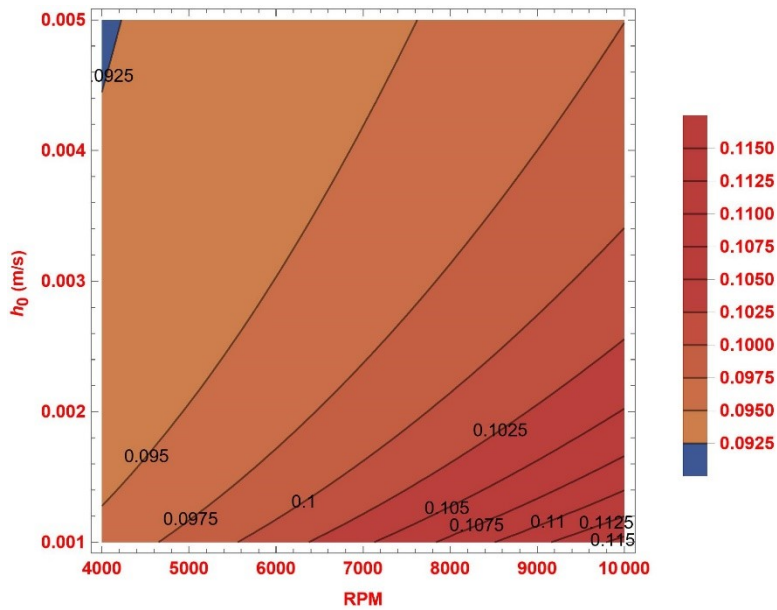18 model that considers the actual bed expansion with settings for different layers of porosities.

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Figure S3. The averaged velocity at the bottom and top surfaces, as well as throughout the entire volume of the bed, measured under different rotation rates, as detailed in the simulation conditions presented in Tables 1 and 2.

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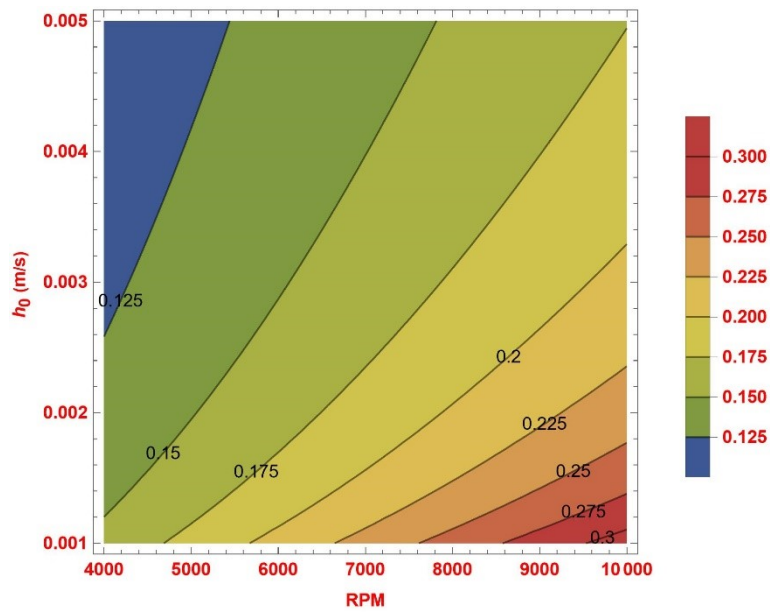

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Figure S4. Variation of superficial gas velocities in the catalytic bed as a function of impeller rotation rates for different solid loadings and bed porosities of 0.3.

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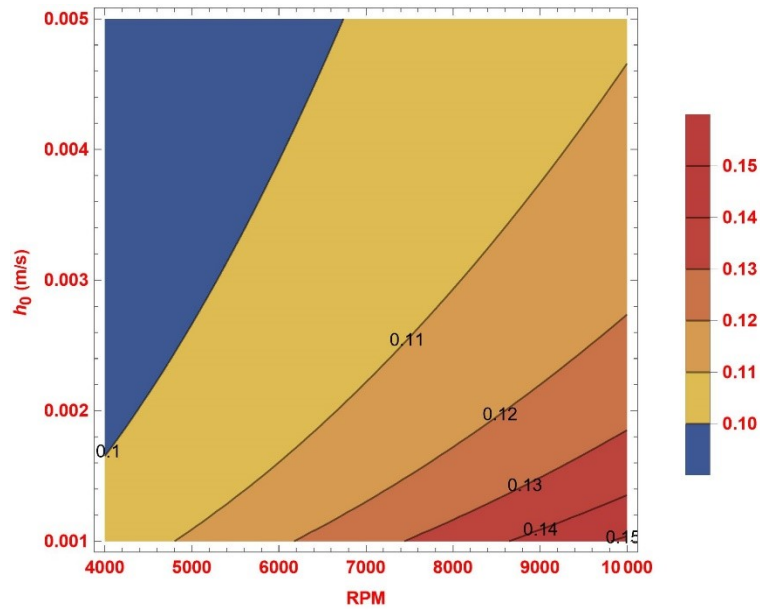
Figure S5. Variation of superficial gas velocities in the catalytic bed as a function of impeller rotation rates for different solid loadings and bed porosities of 0.4.

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Figure S6. Variation of superficial gas velocities in the catalytic bed as a function of impeller rotation rates for different solid loadings and bed porosities of 0.5.
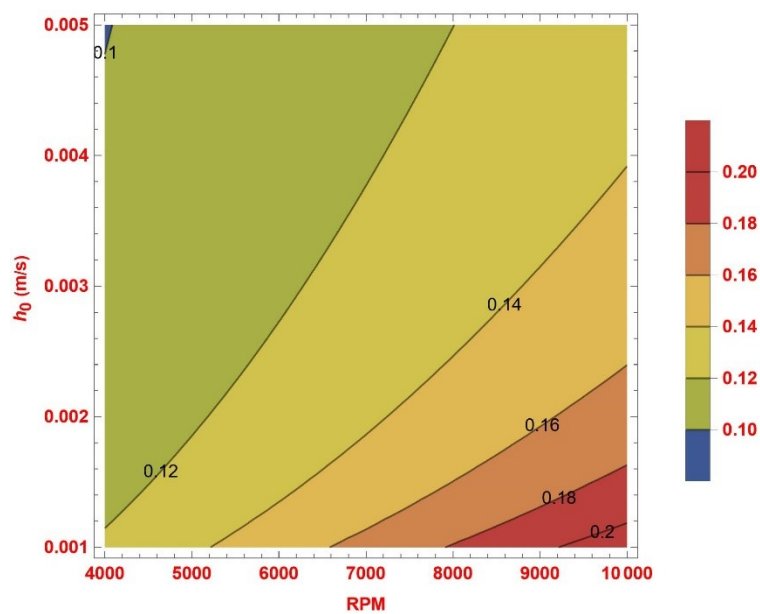
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Figure S7. Variation of superficial gas velocities in the catalytic bed as a function of impeller rotation rates for different solid loadings and bed porosities of 0.6.

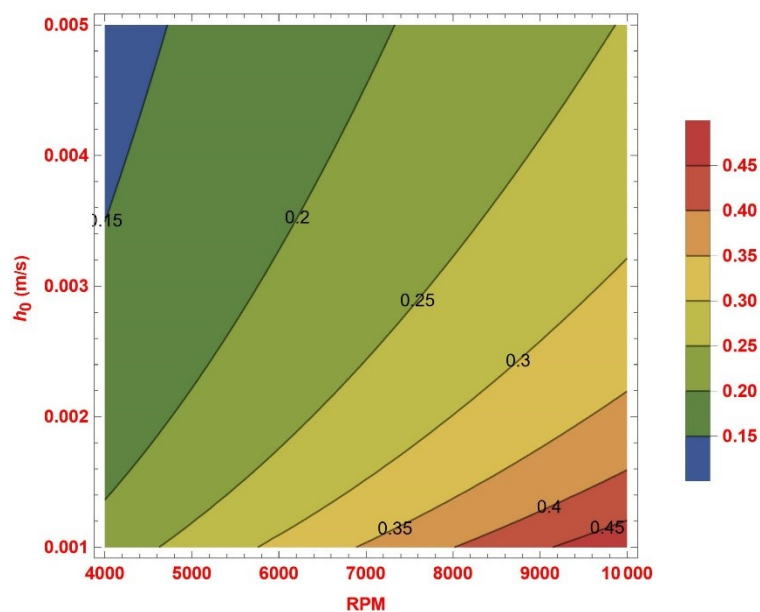37

Figure S8. Variation of superficial gas velocities in the catalytic bed as a function of impeller rotation rates for different solid loadings and bed porosities of 0.7.

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References

42 1   M. Cui, S. R. Kulkarni, S. Wagner, C. Berger-Karin, A. Nagy and P. Castaño, *ACS*
43   *Eng. Au*, 2022, **2**, 103–117.