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Modelling design of multiphase bubble-bed reactors for advanced food-industry technologies

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An EC Copernicus project under this title commenced November 1998 having been catalysed through the good offices of Dr Jindrich Zahradnik, sadly since deceased (INCO COPERNICUS Project IC15-CT98-0904). This paper will overview main elements of collaborative contexts and contributions coming from the four partners. A purpose of website hosted by Aston University as coordinating institution, www.copernicus.aston.ac.uk is to communicate not only major individual components and collaborations facilitated by study exchanges but also shared vision of anticipated exploitation by sector industries. Drawing on this material our presentation - poster will outline original interest vectors of the partners in terms of established expertise and their unification under EC umbrella funding.

Prior liaisons provided our platform on understanding the roles of gas entry conditions and couplings for near field behaviour and modal interpretations and for new representations of synergistic bubble interactions via nonlinear paradigms . It also afforded access to reconciliation of contentious issues in functionally applicable scalings for regime transition in real bubble columns and consolidation of earlier speculation that instability inception in bubble columns might be analogous to that manifested in thermal convective transition of uniphase fluids heated from below. These advances are providing useful new theoretical foundations not only for basic interpretations of experimental data and its application by scaling correlation to bioreactor performance evaluation but also for efficacy validation of “CFD” codes on which some sector hopes have been pinned as avenues to improved and cheaper protocols in exploring configurational and operational options.

Our project incorporates elements of all these aspects, including physical performance evaluations / correlations for oxygen transfer in airlift loops to pilot scale plus pulsed delivery options overcoming inhibition in viscous broths ,also mass-loading impairment of transport dynamics in floc-stabilised cultures, respectively as precursors for implementation in real fermentations of citric acid and beer. CFD aspects are included via a familiarisation / implementation training exercise using FLUENT which was chosen as a globally established product with sustained support services. This aspect is anticipated to be of end-user interest principally as a prospective teaching / training tool for improved insight by bioprocess engineers, many of whom from biochemical backgrounds lack firsthand familiarity with intricate complexities of multiphase turbulence in simple fluids, never mind the challenging constitutions of real broths.

Tempting as it may be merely to advertise ones’ own wares in our era of dissemination justification, we will ensure all aspects are adequately covered by contextual commentary following traditional best practice in scientific reporting.

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