A Comparative Study of Serial, Staggered, and Stochastic Coral Configurations Using Direct Numerical Simulations

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**Abstract.**

Coral reefs are vital components of the coastal ecosystem that, in turn, co-exist and benefit from a wide range of benthic and marine organisms. Moreover, coral reefs directly interact with the hydrodynamics environment in which they grow, thus influencing the fate of the coastal environmental system. In this work, we systematically investigated the similarities and differences observed when using morphologically regular versus stochastically distinct coral reef configurations on the in-canopy hydrodynamics. Using scale-resolving numerical simulations, we found that <FILL IN THE BALNKS>

**Keywords:** Coral Reefs, Canopy Turbulence, Direct Numerical Simulations, Immersed Boundary Method.

1. Introduction
2. Computational Methodology
   1. Governing Equations and Numerical Framework
   2. Coral Reef Configurations
3. Results & Discussions
   1. Phase Averaged Velocity
   2. In-Canopy Similarities and Differences
4. Conclusions
   1. A Subsection Sample

Please note that the first paragraph of a section or subsection is not indented. The first paragraphs that follows a table, figure, equation etc. does not have an indent, either.

Subsequent paragraphs, however, are indented.

### Sample Heading (Third Level). Only two levels of headings should be numbered. Lower level headings remain unnumbered; they are formatted as run-in headings.

#### Sample Heading (Forth Level). The contribution should contain no more than four levels of headings. The following Table 1 gives a summary of all heading levels.

**Table 1.** Table captions should be placed above the tables.

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| Heading level | Example | Font size and style |
| Title (centered) | **Lecture Notes** | 14 point, bold |
| 1st-level heading | **1 Introduction** | 12 point, bold |
| 2nd-level heading | **2.1 Printing Area** | 10 point, bold |
| 3rd-level heading | **Run-in Heading in Bold.** Text follows | 10 point, bold |
| 4th-level heading | *Lowest Level Heading.* Text follows | 10 point, italic |

Displayed equations are centered and set on a separate line.

*x* + *y* = *z* ()

Please try to avoid rasterized images for line-art diagrams and schemas. Whenever possible, use vector graphics instead (see Fig. 1).

**Fig. 1.** A figure caption is always placed below the illustration. Short captions are centered, while long ones are justified. The macro button chooses the correct format automatically.

For citations of references, we prefer the use of square brackets and consecutive numbers. Citations using labels or the author/year convention are also acceptable. The following bibliography provides a sample reference list with entries for journal articles [1], an LNCS chapter [2], a book [3], proceedings without editors [4], as well as a URL [5].

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