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# Computational Fluid Dynamics as a performance aid tool in rowing: utopia or reality

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## ABSTRACT

The massive growth in computational power and advances in numerical modeling have made it feasible to use numerical simulations for analyzing and enhancing sports performance. This practice has already become standard for many years to design and optimize Formula 1 cars or racing sailboats (Robin et al, 2024). In water sports, this remains a challenging task due to the complexity and coupled physical phenomena typically involved, particularly when human interaction comes into play. Moreover, elite athletes already operate near the boundaries of optimal performance, leaving little room for improvement. Consequently, the modeling of all relevant phenomena must be sufficiently accurate to yield meaningful insights. This is essential for analyzing interactions and providing reliable trends when varying certain parameters. The case of rowing is presented here . After outlining the specific fluid mechanics aspects of this sport, it will be shown that Computation Fluid Dynamics (CFD) is now capable of addressing such complexity (Robert et al.,2019). Then, the main features of the high-fidelity Simulator of Performance in Rowing (SPRing) will be described, see Fig.1 and Leroyer and Barré, 2022. The remaining elements to be addressed in the simulator to be used in production will eventually be presented.

FIGURE 1: Left : real rower life. Right : illustation of a realistic rendering from SPRing.

## References

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