

Abstract Submitted  
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**Acceleration of swimming bacteria at “zero” Reynolds number<sup>1</sup>**  
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RAYMOND GOLDSTEIN, University of Cambridge — Self-propelled objects can  
accelerate at “zero” Reynolds number  $Re$ . An incompressible fluid responds “instan-  
taneously” and globally to the motion of bounding surfaces. When the propulsion  
mechanism of a bacterial body, a helical bundle of flagella, forms and rotates, the  
body accelerates according to  $F = ma$ , where  $F$  is the sum of forces exerted on the  
body: drag plus the thrust of the flagella. The flagellar rotation instantly moves all  
the surrounding fluid, as does the body’s motion on, acting on its surround. The  
acceleration of bacteria stopped by a collision and beginning reverse swimming is  
important in the analysis of the jammed phase in the onset of Zooming BioNematic  
(ZBN). An instantaneous one step displacement has been used to analyze the flow  
surrounding swimming bacteria.

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