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**A Finite Element Analysis of the Optimality of Sphagnum Moss Vortex Rings** GUIDO DOMINGUEZ, DWIGHT WHITAKER, Pomona College Physics Department — *Sphagnum* moss disperses its spores using a vortex ring generated by a pressurized capsule that ruptures on a warm sunny day. This mechanism of spore dispersal enables *Sphagnum* to carry its spores beyond the turbulent boundary layer where it grows so that they can be carried indefinitely by wind currents, which would not be possible if the tiny spores were launched ballistically. Here we present a finite element analysis of the explosive spore discharge from *Sphagnum* capsules using ANSYS Fluent. We model the spore capsule as a pressurized cylinder with a disk shaped cap that is pushed by the outflowing gas, which is taken to be axisymmetric. The cap impedes the flow of the fluid during as the vortex ring is created and makes this case qualitatively different than the slug flow from a piston-driven system without a cap. By matching the trajectories of vortex rings in our models to high speed videos of capsule explosions we can determine the initial pressure of the capsule. Moreover by analyzing the flow of vorticity out of the capsule we can determine how the cap affects the optimality of vortex ring impulse and compare *Sphagnum* vortex rings to the optimal vortex rings produced by animals.

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