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Deriving Gas-Phase Exposure History through Computationally Evolved Inverse Diffusion Analysis

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Health risks due to indoor air are large and are ranked among the top five environmental health risks by the Environmental Protection Agency~\cite{EPA}. High indoor pollutant levels are a result of emissions from indoor sources, limited air exchange, high surface area to volume ratios, and indoor chemistry. This paper presents an ongoing project to find inverse diffusion differential equations employing advanced computational techniques. A technique known as Genetic Programming (GP) will be used to evolve candidate equation solutions. The final result will be validated by applying it to core samples from Dr. Morrison's laboratory exposure chamber for which the exposure histories are known. Beyond indoor human exposure, the validated method will be transferable to many environmental systems where diffusion records historic exposures in solid materials.

Joshua Eads is currently a Junior at the Missouri University of Science & Technology majoring in Computer Science. He has been involved in undergraduate research for the past three years, working on a variety of multi-disciplinary problems in optimization and evolutionary computation. Outside of course work, Josh is an active member in the local Association for Computing Machinery chapter and currently serving as President. He has worked to give students more opportunities to get involved with project groups on campus and to meet potential employers focused in computing.