Multiscale modeling and control of pulp digester for sustainability of pulp industry in the pandemic of COVID19

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In this talk, Dr. Kwon will focus on the pulp and paper industry (PPI) which is undergoing a paradigm shift triggered by growing paper demand for e-commerce packaging paper due to the online shopping boom and by unprecedented megatrend toward hygiene products to reduce the risk of COVID-19. Despite the critical role of fiber morphology in dictating final paper quality, there exist fundamental knowledge gaps regarding (i) how fiber morphology as well as other microscopic properties are influenced by macroscopic variables, (ii) how fiber-to-fiber heterogeneity affects overall performance of a pulp digester, and (iii) how frequent product grade transitions can be mitigated to reduce economic loss. Dr. Kwon will fill these knowledge gaps utilizing novel multiscale models and two-tier control systems. Moreover, the proposed model identification and control approach will address one of the biggest challenges in Koopman-based control theory (i.e., obtaining a finite-dimensional closed-form linear approximation of nonlinear systems).