Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Composite reinforced metallic cylinder for high speed rotation DR. SAHADEV PRADHAN, Chemical Technology Division, Bhabha Atomic Research Centre, Mumbai- 400 085 — The objective of the present study is to design and development of the composite reinforced thin metallic cylinder to increase the peripheral speed significantly and thereby improve the separation performance in a centrifugal gas separation processes through proper optimization of the internal parameters. According to Dirac equation (Cohen (1951)), the maximum separative work for a centrifugal gas separation process increase with 4th power of the peripheral speed. Therefore, it has been intended to reinforce the metallic cylinder with composites (carbon fibers: T-700 and T- 1000 grade with suitable epoxy resin) to increase the stiffness and hoop stress so that the peripheral speed can be increased significantly, and thereby enhance the separative output. Here, we have developed the mathematical model to investigate the elastic stresses of a laminated cylinder subjected to mechanical, thermal and thermo-mechanical loading. A detailed analysis is carried out to underline the basic hypothesis of each formulation. Further, we evaluate the steady state creep response of the rotating cylinder and analyze the stresses and strain rates in the cylinder.

Dr. Sahadev Pradhan
Chemical Technology Division, Bhabha Atomic Research Centre

Date submitted: 05 Jul 2017 Electronic form version 1.4