Department of Mechanical Engineering

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

2.800 TRIBOLOGY

Fall 2003

Homework # 5   **Due: Tuesday, 4 November 2003**

We are trying to develop wear resistant alloys that can be used in applications where wear by plowing and wear by delamination can occur. One idea we came up with is to create dispersion-strengthened alloys by creating TiB_2 particles in copper.

Suppose we can control the particle size of TiB_2 and disperse them uniformly throughout the matrix. We want to make two experimental alloys:

Alloy A – copper with 0.02 microns diameter TiB_2 particles
Alloy B – copper with 1 micron diameter TiB_2 particles

Determine the total volume fraction of TiB_2 that we should put into the copper alloy to minimize both the wear by plowing and wear by delamination.

State your assumptions clearly.