Some Misunderstandings Related to WTC Collapse Analysis

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ABSTRACT
This article elaborates on variables associated with the collapse of the North Tower of the World Trade Center. The previously published quantifications of inertia, column capacity, and the assumptions related to the beginning of downward motion, are examined and corrected. The reasons for false conclusions reached in several previous analyses are presented.

Key words: Large Deflections, Plasticity, Collapse

1. INTRODUCTION

This presentation is not so much about how the WTC towers failed, but about *how they could not* fail. The objective is to eliminate erroneous concepts supported by false assumptions and by the use of incorrect values for velocity, mass, and column resistance. The only complete hypothesis of the global collapse mechanism of the Towers is a successive flattening of stories associated with compressive column failure and referred to as a Progressive Column Failure mode or PCF in brief. (In the past this mode was often referred to as *pancaking*, but this term is not used here to avoid ambiguities). It is explained here why PCF could not be the mode of the ultimate destruction. The previously published material is quoted and the new points are brought up. Appendix C can be of interest to those who want a broader description of facts associated with the collapse. The available information relating to the kinetics of the collapse is summarized first.

2. THE FIRST PHASE OF DOWNWARD MOTION

A good comparison between various collapse models and reality makes it necessary to have some observations of the towers during collapse. To our knowledge, the most accurate and reliable data available are provided by video footage taken by Etienne Sauret [7], and used in the documentary film *WTC: The first 24 hours*. This footage clearly shows the top of WTC 1, including the roof line, for about the first 3.2 seconds of the collapse. Each pixel represents 0.27 m of the tower, and the frame rate is 30 per second, allowing for fairly accurate measurements of the motion. It is

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