NATIONAL INSTITUTE OF AEROSPACE

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Guide to APA-Based Models

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Guide to APA-Based Models

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For

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In Robins and Delisi (2008), a linear decay model, a new IGE model by Sarpkaya (2006), and a series of APA-Based models were scored using data from three airports. This report is a guide to the APA-based models.

A list of models used in Robins and Delisi (2008), as presented in Section 3, is as follows:

**APA 3.1.1**
- the original APA model with a minimum circulation decay in ground effect of \( \Gamma / \Gamma_o = 1 - T/K \), \( K=8 \), and a modified version of APA 3.1.1 with \( K = 5 \).

**APA 3.2.1**
- APA 3.1.1 with Proctor’s model for the circulation decay during the initial stages of IGE; with the same minimum decay rates as in APA 3.1.1. Proctor’s model is linearly phased in between the times of 0.25T and 0.4T, where T is the time scale \( b_o/V_o \), \( b_o \) and \( V_o \) being the initial separation and descent speed of the vortices.

**APA 3.2.1E**
- APA 3.2.1 with a minimum decay rate equal to the environmental decay rate at the beginning of IGE or \( \Gamma / \Gamma_o = 1 - T/K \), \( K=8 \), if the environmental rate is less than this; also scored was a version of APA 3.2.1E with \( K=5 \).

**APA 3.2.2**
- An alternate version of APA 3.2.1 (\( K=5 \) only) where the onset of Proctor’s model occurs exactly at a time of 0.25T.

**APA 3.2.2E**
- An alternate version of APA 3.2.1E (\( K=5 \) and 6) where the onset of Proctor’s model occurs exactly at a time of 0.25T.

**Sarpkaya’s IGE Model**

**1 – T/5 Linear Decay**
- APA 3.1.1 with the IGE non-dimensional decay rate equal to 1 – T/5.

The source codes for models APA 3.1.1, APA 3.2.1, APA 3.2.1E, APA 3.2.2, APA 3.2.2E, and Sarpkaya’s IGE Model are provided on an accompanying CD-ROM disk. The one-line code change that determines the value of \( K \) for the APA 3.X.X models is clearly indicated in the code for the respective models. To find this code,
simply search for “C*********” in files ge1pth.f and ge2pth.f to find the code that sets K.

The code change required to transform APA 3.1.1 to the 1 – T/5 Linear Decay model is as follows:

Original Code from APA 3.1.1 files ge1pth.f and ge2pth.f:

```c
C
C***************** FOLLOWING CODE FOR K=8 **********************
DGMIN = 0.125*TWOPI*VZIN*VZIN
C***************** FOLLOWING CODE FOR K=5 **********************
CCC
DGMIN = 0.2*TWOPI*VZIN*VZIN
C****************************************************************
C
IF(DELGAM.LT.DGMIN) DELGAM=DGMIN
C
DGFA = DELGAM/GAM(1)
DO I=1,NPTS
   DGAM(I) = GAM(I) * DGFA
ENDDO
C
```

Modified Code for the 1 – T/5 Linear Decay Model:

```c
C
DELGAM = 0.2*TWOPI*VZIN*VZIN
C
DGFA = DELGAM/GAM(1)
DO I=1,NPTS
   DGAM(I) = GAM(I) * DGFA
ENDDO
C
```

The input parameters required for all code versions are the same as described for LINES 3-10 in Robins and Delisi, 2005.
References

