

The National Streamflow Statistics Program:

An Expanded Hydrologic Tool for Planning,
Management, and Design

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National Streamflow Statistics Program (NSS)

- A Microsoft Windows¹ compatible computer program;
- Provides an easily accessible graphical user interface to estimate streamflow statistics for ungaged sites across the United States;
- Effectively replaces the National Flood Frequency Program (NFF);

¹ name is for identification purposes only and does not constitute endorsement by the U.S. Geological Survey.

In a nutshell...

NSS is a graphical user interface that solves conventional regression equations for flood and low-flow frequency:

$$Q_{100} = 0.582A^{0.715} * S^{0.256} * L^{0.115}$$

Where:

Q_{100} is the estimated flood discharge for a flood with a 100-yr recurrence interval;

A is drainage area, in square miles;

S is 10-85% slope of the basin, in feet/feet; and

L is the length of the channel to the basin divide, in miles.

In 2009 the NSS contains:

- **Rural flood-frequency equations for all 50 States, 2 U.S. Territories and one U.S. Region (Southwest US);**
- **Urban flood-frequency equations for 20 States;**
- **National urban flood-frequency equations;**
- **Low-flow duration/frequency equations for 34 States;**
- **Region-of-Influence flood-frequency analysis for 6 states;**
- **>3000 equations;**

Reports in the NSS

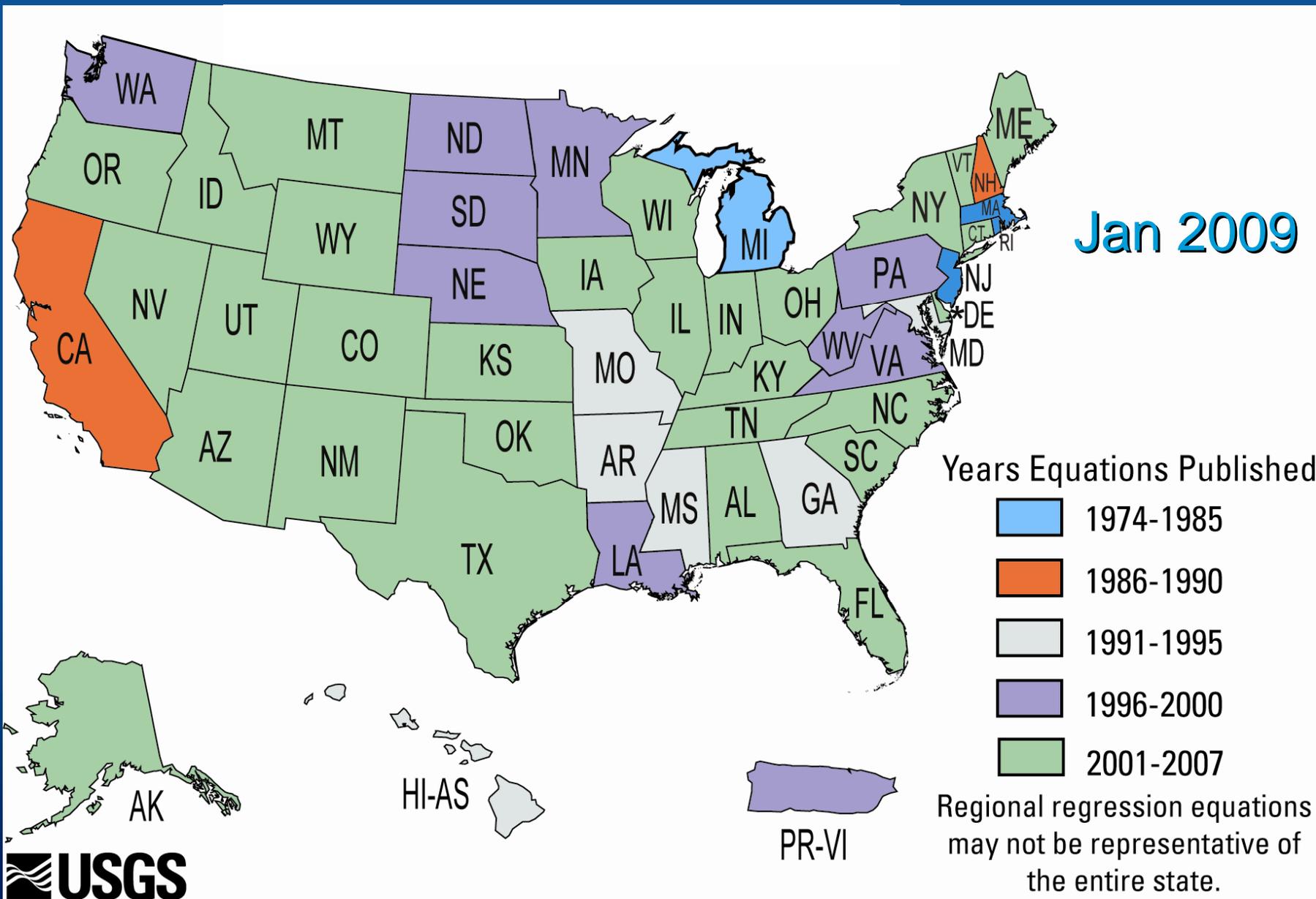
- 60 low-flow frequency/duration reports
- 100 flood frequency reports;

Age-maps for flood frequency

- Rural flood frequency report ages ²;
- Urban flood frequency report ages ²;
- Low flow-frequency/duration report ages ²;

² Report may not be representative of entire State geographic area;

Rural Peak-Flow Regression Equations



Features of NSS v.4.0

- Estimates rural and urban flood-frequency discharges for ungaged streams by use of regression equations, and for six States, by region-of-influence analysis;
- Estimates a wide range of low-flow duration and frequency discharges for ungaged streams;

Features of NSS v.4.0 (cont.)

- **Estimates discharges for natural streams.** The program does not account for the effects of water diversions, dams, flood-detention structures, and other manmade works;
- **Statistically weights estimated peak discharges for ungaged sites with drainage basins that span multiple hydrologic regions using the percentage of drainage area in each region within a given State (not always correctly);**

Features of NSS v.4.0 (cont.)

- Statistically weights estimated and observed peak discharges for streamgaging stations using the equivalent years of record of the regression estimate and the number of years of observed record as the weighting factors;
- Statistically weights estimated peak discharges for ungaged sites obtained from regression equations and from the flow per unit area for an upstream or downstream gaging station;

Features of NSS v.4.0 (cont.)

- Plots hydrographs of flood flows; and
- Generates frequency graphs for peak-flow frequency analyses.

2009 Issues:

- Errors in the input of some equations;
- Parameter naming issues that have emerged because of low-flow and flood-frequency equations;
- Some non-standard regression equation formats are not compatible;
- Rounding errors;
- GUI labeling errors.

The NSS windows...

National Streamflow Statistics (NSS)

File Graph Help

State: Alabama Site Name: Unnamed

Rural: Rural 2 [New] [Edit] [Delete]

Rural 2
Basin Drainage Area: 444 square miles
1 Region
Region: Region_1
Contributing_Drainage_Area = 444 square miles

Urban: [New] [Edit] [Delete]
No Scenarios Available

Recurrence Interval, yrs	Peak, cfs	Standard Error, %	Equivalent Years
2	13600	35	3
5	22100	34	4
10	28500	35	5
25	36800	37	7
50	43100	39	7
100	49900	41	8
200	56500	43	9
500	65800	46	9

Frequency Plot Hydrograph Plot Weight

Editing weight for "Rural 2 (weighted)"

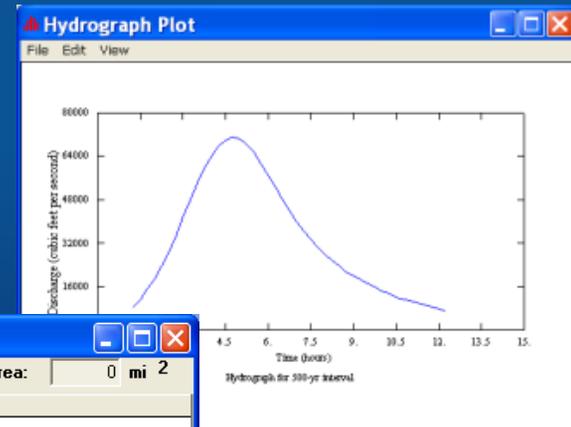
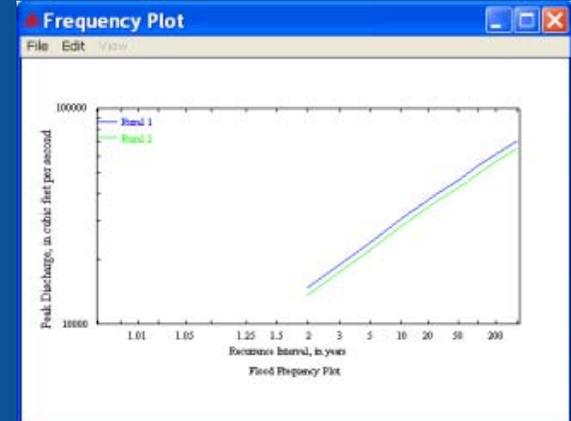
Weight for gaged site using observed data
 Weight for ungaged site using weighted gaged values

Years of observed data: 0

Enter observed data for each interval:

Recurrence Interval (years)	Estimated Flow	Observed Flow	Weighted Flow
2	1180	0	1180
5	1960	0	1960
10	2580	0	2580
25	3500	0	3500
50	4290	0	4290
100	5140	0	5140
200	6100	0	6100
500	7530	0	7530

Apply Cancel



Edit Scenario

Scenario: Rural 2 Total Basin Drainage Area: 0 mi²

Regions:

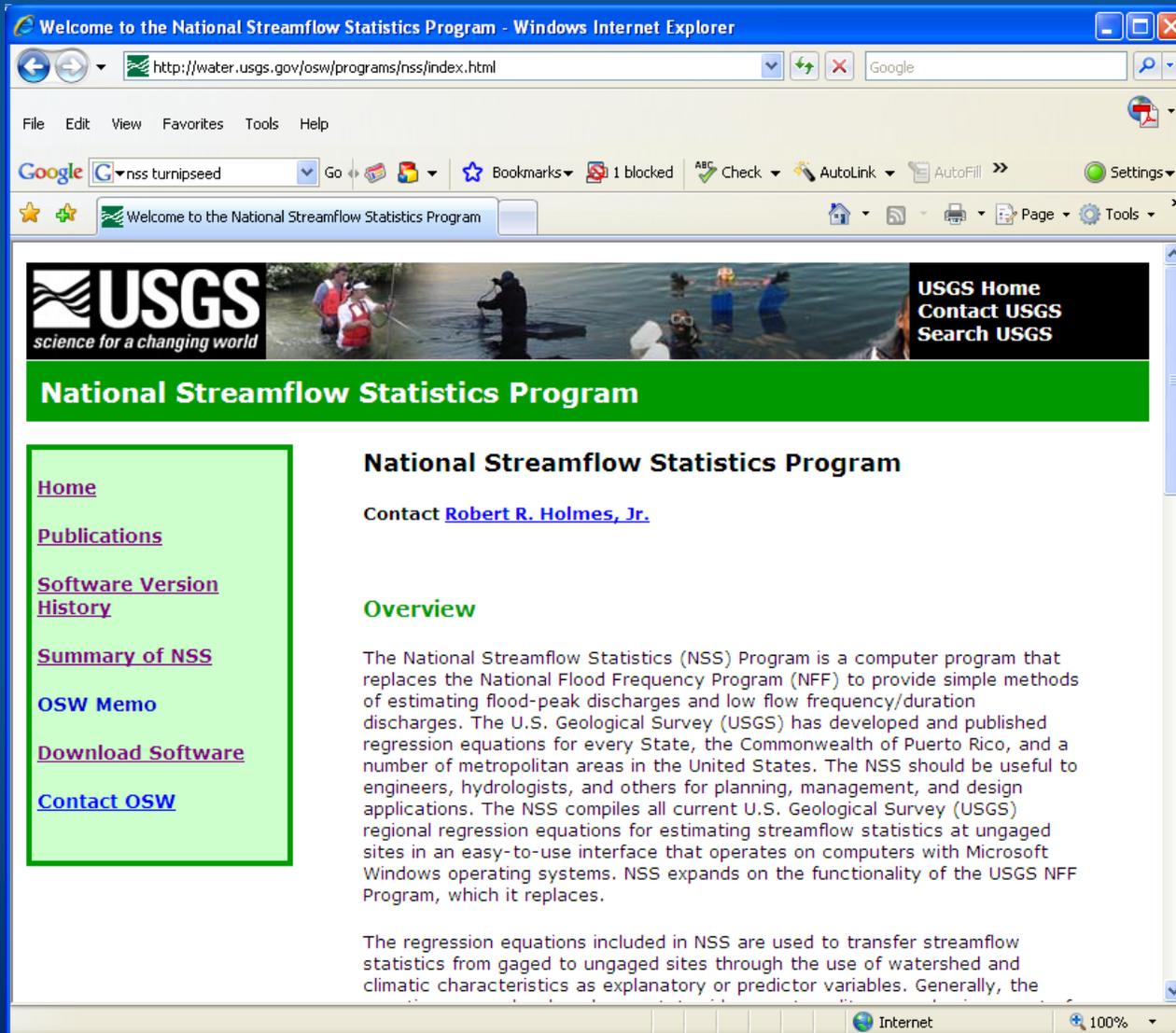
- Blue_Ridge-Piedmont_Req
- Coastal_Plain_Region
- Raleigh_and_Charlotte_and
- ROI_Blue_Ridge-Piedmont
- ROI_Coastal_Plain_Region
- ROI_Sand_Hills
- Sand_Hills_Low_Flow
- Sand_Hills_Region

Crippen & Bue (1977) flood region: None [Map...]

Ok Cancel

NSS Website...

NSS Homepage



The screenshot shows a Windows Internet Explorer browser window displaying the NSS homepage. The address bar shows the URL <http://water.usgs.gov/osw/programs/nss/index.html>. The page features a green header with the USGS logo and the text "National Streamflow Statistics Program". A navigation menu on the left includes links for Home, Publications, Software Version, History, Summary of NSS, OSW Memo, Download Software, and Contact OSW. The main content area has a title "National Streamflow Statistics Program" and a contact link for Robert R. Holmes, Jr. Below this is an "Overview" section with a paragraph describing the program's purpose and functionality. The browser interface includes a search bar, a menu bar (File, Edit, View, Favorites, Tools, Help), and a status bar at the bottom showing "Internet" and "100%" zoom.

Welcome to the National Streamflow Statistics Program - Windows Internet Explorer

<http://water.usgs.gov/osw/programs/nss/index.html>

File Edit View Favorites Tools Help

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Welcome to the National Streamflow Statistics Program

 **USGS**
science for a changing world



National Streamflow Statistics Program

Contact [Robert R. Holmes, Jr.](#)

Overview

The National Streamflow Statistics (NSS) Program is a computer program that replaces the National Flood Frequency Program (NFF) to provide simple methods of estimating flood-peak discharges and low flow frequency/duration discharges. The U.S. Geological Survey (USGS) has developed and published regression equations for every State, the Commonwealth of Puerto Rico, and a number of metropolitan areas in the United States. The NSS should be useful to engineers, hydrologists, and others for planning, management, and design applications. The NSS compiles all current U.S. Geological Survey (USGS) regional regression equations for estimating streamflow statistics at ungaged sites in an easy-to-use interface that operates on computers with Microsoft Windows operating systems. NSS expands on the functionality of the USGS NFF Program, which it replaces.

The regression equations included in NSS are used to transfer streamflow statistics from gaged to ungaged sites through the use of watershed and climatic characteristics as explanatory or predictor variables. Generally, the

<http://water.usgs.gov/osw/programs/nss/index.html>

Publications

Welcome to the National Streamflow Statistics Program - Windows Internet Explorer

http://water.usgs.gov/osw/programs/nss/pubs.html

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Welcome to the National Streamflow Statistics Program



National Streamflow Statistics Program

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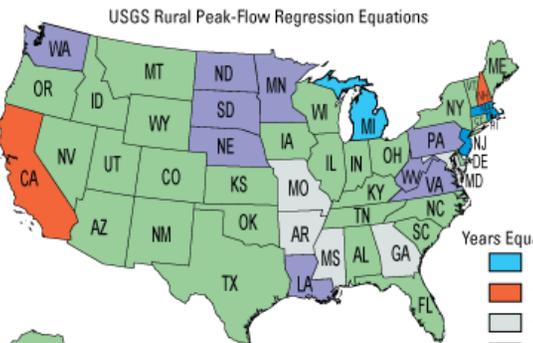
National Streamflow Statistics Program

Regional Regression Equation Publications by State

Please choose a state from the list or map!

AL	MT
AK	NE
AS	NV
AR	NH
AZ	NJ
CA	NM
CO	NY
CT	NC
DE	ND
FL	OH
GA	OK
HI	OR
IA	PA
ID	PR
IL	RI
IN	SC
KS	SD
KY	TN

USGS Rural Peak-Flow Regression Equations



Years Equations Published

- 1974-1985
- 1986-1990
- 1991-1995

100 flood
frequency
Reports
for free
download

60 low-flow
frequency
Reports for free
download

<http://water.usgs.gov/osw/programs/nss/pubs.html>

History

The screenshot shows a Windows Internet Explorer browser window with the following elements:

- Address Bar:** <http://water.usgs.gov/osw/programs/nss/history.html>
- Navigation:** Back, Forward, Stop, Refresh, Home, Print, Page, Tools.
- Search:** Google search bar with "nss turnipseed" entered.
- Page Header:** USGS logo with the tagline "science for a changing world" and a banner image of people in a river. Navigation links: USGS Home, Contact USGS, Search USGS.
- Section Header:** National Streamflow Statistics Program
- Left Sidebar (Green Box):**
 - [Home](#)
 - [Publications](#)
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 - [Summary of NSS](#)
 - [OSW Memo](#)
 - [Download Software](#)
 - [Contact OSW](#)
- Main Content:**
 - National Streamflow Statistics Program**
 - Contact [Robert R. Holmes, Jr.](#)
 - Version History**
 - National Streamflow Statistics program (NSS) Version 4.0 - 2006/12/01** - Added the abilities to (1) solve regression equations for all types of streamflow statistics, not just flood-frequency statistics, (2) use region-of-influence regression for states where it is implemented, (3) compute 90-percent prediction intervals for estimates where methods for computing them are documented in reports.
 - National Flood Frequency program (NFF) Version 3.2 - 2004/12/14** - Updated the database to NFFv3.2_2004-12-14.mdb. Added new peak-flow equations for Connecticut and Kentucky. Corrected an error in the units displayed for conveyance in the Houston urban equations from in/hr to cubic feet per second. Corrected an error in the Wisconsin Area 1 equation for the 5-year recurrence interval.
 - NFF Version 3.2 - 2004/09/29** - Updated the database to NFFv3.2_2004-09-29.mdb. This database contains new peak-flow equations for Alaska, Idaho,

<http://water.usgs.gov/osw/programs/nss/history.html>

Download the Software

NSS - National Streamflow Statistics Program - Windows Internet Explorer

http://water.usgs.gov/software/NSS/

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NSS, Version 4.0

National Streamflow Statistics program

NOTE: This is a new version of the NSS tools, and this new version will NOT work with the old NSS database (NSS_1-23-2008.mdb)!

Information

- [Summary of NSS](#)
- [Version history](#)
- [How to order](#) U.S. Geological Survey printed documentation
- [How to register](#) to receive software updates and enhancement notices

Software

- Select the following links to retrieve the two distribution files required for a complete installation of NSS. See the [README](#) file for installation instructions.

[NSSv4.0b8.exe](#) (6.3 Mb) self-extracting executable of the NSS software

[NSS v4 2008-12-18.mdb](#) (12 Mb) Microsoft Access data base needed to run NSS - **Previous version of the data base was dated: 1/23/08**

(References to commercial vendors of software products or services is for informational

<http://water.usgs.gov/software/NSS/>

Downloading the Software

Minimum of two files to download:

1. Executable program: NSSv4.0b8.exe; and
2. MS-Access¹ Database: NSS_v4_2008-12-18.mdb

One or two files additional files to download for ROI (see <http://water.usgs.gov/software/NSS/>)

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NSS Program Reports

Ries, et al, 2006

Turnipseed and Ries, 2007

Near future enhancements:

- Input reports that are not currently in the NSS;
- Fix errors in the input of some equations;
- Enhance NSS to accept non-conventional regression;
- Add logistical equation interface;
- GUI labeling errors;

Thanks!

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